IDS # 5

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. 0290112

Art Unit: 1109
Examiner: H. Myers

In re application
PETER J. JESSUP ET AL.

Serial No. 08/077,243
Filed: June 14, 1993

GASOLINE FUEL

The Honorable Commissioner
of Patents and Trademarks
Washington, D. C. 20231

Sir:

INFORMATION DISCLOSURE STATEMENT NO. 5

In addition to the references submitted with IDS No. 4, enclosed herewith, Applicants further desire to make the Examiner aware of the following:

Section A

Applicants and their attorney recently became apprised of more materials of character similar to those submitted in IDS No. 3, Section F, Attachment I. Specifically, the materials discovered were gasoline survey data in internal corporate memoranda of applicants' assignee, Union Oil Company of California, dba Unocal. A review of the materials for gasolines of RVP $\leq$ 7.5 psi was made, and the pages containing such data (and **not** already in Attachment I of IDS No. 3) accompany this document as **Attachment J** (four pages). For the convenience of the Examiner, the RVPs $\leq$ 7.5 psi on Attachment J are circled in red.

Section B

Refinery Data--Automotive Fuels

Applicants and their attorney also recently became apprised of internal corporate documents containing data pertaining to gasoline produced from its Los Angeles refinery between 1972 and

1983. A review of these documents for references to gasoline blends of RVP ≤ 7.5 psi was made, and the pages containing such data accompany this document as **Attachment K** (seven pages). Again, for the convenience of the Examiner, the RVPs ≤ 7.5 psi on Attachment K are circled in red.

In addition, internal corporate documents containing data pertaining to gasoline produced from its San Francisco refinery between 1968 and 1978 were recently discovered. A review of these documents for disclosures of gasoline blends of RVP ≤ 7.5 psi was made, and the data for each blend of RVP ≤ 7.5 psi is shown in **Attachment L** (twenty-one pages). Again, for the convenience of the Examiner, the RVPs ≤ 7.5 psi on Attachment L are circled in red.

(It is specifically noted that applicant makes no acknowledgement or admission that all data on any attachment herewith submitted are necessarily accurate. For example, it would seem beyond doubt that the reported RVPs of 5.7 and 2.6 psi, respectively, on pages K-3 and K-4 of Attachment K are in error, such values for commercial gasolines being, at a minimum, highly, highly suspect.)

Section C

Refinery Data--Aviation Fuels

Among the internal corporate documents recently reviewed included tables of properties of aviation gasolines produced in the Los Angeles refinery of applicants' assignee. **Attachments M and N** (each four pages) are representative of the data pertaining to these aviation fuels, with **Attachment M** being for 80-87 Octane Aviation fuel and **Attachment N** for 100-130 Octane Aviation fuel.

The Examiner has in IDS No. 3 previously been made aware

that aviation gasolines have some features similar to the fuels employed in the invention, e.g., RVP & T50. (See IDS No. 3, Overview, page 5 and Section A, page 17.) Attachments M and N also show the low RVP and T50 values for aviation gasolines, as well as low T90s. Thus, in a sense, the fuels employed in applicants' claimed process have **some** features (RVP, T50, & T90) more similar to aviation fuels than typical automotive fuels.

Nevertheless, insofar as applicants are aware, the fuels required in applicants' claims are novel and non-obvious over aviation fuels. And certainly, the **use** of applicants' fuels, no matter how close they may be to prior art aviation fuels--indeed, even if fully anticipated by prior art aviation fuels--for combustion in an **automotive** engine to minimize **auto** exhaust emissions is both highly novel and non-obvious over the prior art.

Although the RVP and/or distillation characteristics of aviation fuels are, as stated above, in some respects similar to the requirements of some of the fuels recited in the present claims, the **reasons--the known reasons**--aviation gasolines have their required RVP and distillation properties are unrelated to automotive operation. For example, the low RVP of aviation fuels (5.5 to 7.0 psi) is to control excessive vapor formation and prevent vapor lock which would otherwise occur **at high altitudes**--a problem singularly related to aircraft operation and <u>un</u>related to automobile operation. Thus, one of ordinary skill in the art, although knowing of the properties of aviation fuels, would have no reason to believe a benefit would pertain if those same properties were required in automotive gasoline, and certainly, there is nothing to suggest a benefit relating to auto emissions.

In any event, while applicants' attorney desires to

ensure that the Examiner is aware of the similarity in some properties between the fuels required in the claims and aviation fuels, the paramount fact to remember is that aviation fuels are designed **for aircraft**, not automobiles. The differences in the fuels stem largely from the difference in engines and operational environments: high altitude vs. ground transport, air-cooled vs. water cooled engines, and the need (in the case of autos) for unleaded, oxygenated fuels for environmental reasons, with the usual aviation fuel being both leaded and un-oxygenated, the latter to prevent destruction of seals, gaskets, and the like in aviation equipment. More detail relating to aviation gasolines in general can be found in **Exhibit O**, taken from Chapter 5, "Aviation Fuels," of the Manual on Significance of Tests for Petroleum Products: 5th Edition, George V. Dryoff, ed., published in 1989 by the ASTM, pp. 45-52; see most especially pages 49-51.

In addition, aviation gasolines are so different from automotive fuels that even the octane ratings are determined by different test procedures, with there being no one-to-one correlation between the (R+M)/2 octane determination for automotive fuels and that for aviation fuels.

Thus, for the foregoing reasons, it is submitted that the data in Attachments M and N pertaining to aviation gasolines in no way, either by themselves or in proper combination (if possible) with any prior art of record, teach or suggest the invention presently claimed.

Section D

Attachment A of IDS No. 3 sets forth a computerized listing of all gasoline data found in the publications submitted with IDS No. 3, Section A, in which the RVP was less than 7.0 psi

and the T50 was no greater than 215° F. Importantly, Attachment A also listed the locations in the publications where the gasoline data could be found. Thus, Attachment A made a useful reference tool for quickly evaluating a lot of published gasoline data, as well as quickly finding the location of any particular gasoline in a document discussed in IDS No. 3, Section A.

This computerized data base has now been expanded, with the aim being to include the relevant properties of **all** unleaded gasoline compositions disclosed in **all** publications of record dated pre-1991 in which the RVP is no greater than 7.5 psi. In other words, whenever a pre-1991 publication (including those submitted herewith in IDS No. 4) set forth a table of gasoline properties with an RVP of 7.5 psi or less (regardless of T50 or any other property), the relevant properties were entered on the computer data base. The entire data base (a total of **293** lines of data each identified by an OBS number) is included herewith as **Attachment P**, the data being sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90. (Note: An extra, loose copy of Attachment P is also being provided for the convenience of the Examiner.)

It should be understood that the main reason applicants are providing **Attachment P is to help the Examiner review and compare the gasoline data in the publications of record. Moreover, should the Examiner desire the data of Attachment P to be sorted differently, or to exclude certain data and then be sorted (<u>for example</u>, by excluding all data having a T90 > 315° F. and then sorted by increasing or decreasing RVP, T50, or T90), all she need do is call applicants' attorney at 714-577-1250, and if a sort can be done for what she desires, the information will then be FAXed to her.**

(It should be noted that Attachment P contains some duplicate data. The reason for this is that two or more publications of record may have taught an identical fuel of RVP $\leq$ 7.5 psi. With the exception of the duplicate data found in the many Burns patents of record (those fuels being reported in Attachment P but once), Attachment P reports the fuels of identical properties as many times as found in different publications.)

In addition, a number of miscellaneous points relative to Attachment P must be made: First, there is no admission by applicants that all data on Attachment P are necessarily **prior art** data. Nor is there any admission that every fuel on Attachment P is necessarily a **gasoline** fuel. And there is no admission that all the data are accurate. Some, of course, is inherently inaccurate, since the data in the original document are flawed or questionable. (For example, see OBS 291 on page P-12 of Attachment P, where the reported data for Fuel 8 in Table X of the publication "Reformulated Gasoline for Clean Air" by Boekhaus et al. would have a gasoline in which the sum of aromatics, paraffins, and olefins is substantially less than 100%.) Moreover, while every effort has been made to ensure accuracy in transposing data from the original publications to Attachment P, it stands to reason, with almost 300 lines of data entry, that some information may have been transposed incorrectly. In any and all cases where data on Attachment P are at odds with the original document, the data in the original document will, of course, necessarily prevail as what is taught therein.

Section E

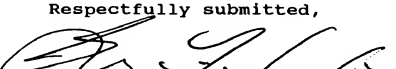
In the course of preparing the accompanying amendment, a review of previously submitted IDS No. 3 was made, and a few trivial and inconsequential errors were found. These errors

are:

(1) In IDS No. 3, Section B, on page 8, Fuel 364 of CRC 566 was identified as among those having an RVP between 7 and 8 psi and a T50 no greater than 215° F. In fact, Fuel 364 had an RVP of 8.1 psi and should not have been included as among fuels having a 7-8 psi RVP, and therefore, its inclusion on page 8 of Section B of IDS No. 3 was an error.

(2) In IDS No. 3, Section B, on page 9, one fuel in SAE 770811, Table A-1, was mis-identified as among those having an RVP between 7 and 8 and a T50 no greater than 215° F. Fuel F-9 had an RVP of 6.54 psi and a T50 of 215° F. and thus should **not** have been included in Section B. Instead, Fuel F-9 should have been reported in Section A of IDS No. 3 as among those having the properties of RVP < 7.0 psi and T50 ≤ 215° F. (See IDS No. 3, Section A, page 4.) In addition, in Section B, on page 9, other fuels in SAE 770811 should have been included among those having an RVP between 7 and 8 and a T50 no greater than 215° F., specifically, fuels F-1 and F-17 of Table A-1. However, now that all fuels in Table A-1 having an RVP of 7.5 psi or less (regardless of T50 or any other property) are included on the computer compilation (Attachment P, included herewith), any confusion generated by the errors with respect to the fuels of SAE 770811, Table A-1, should be resolved. All of the following fuels from Table A-1 are on said computer compilation: F-1, F-3, F-6, F-9, F-11, F-12, F-13, F-14, and F-18. (F-17 is not included since its RVP is greater than 7.5 psi.)

Respectfully submitted,



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714-577-1250

TUCSON AREA

UNLEADED REGULAR GASOLINE

SEPTEMBER 1976

BRAND	ARCO	EXXON	MOBIL	SHELL	STANDARD	TEXACO	UNION
API GRAVITY	60.3	60.4	59.9	62.1	59.2	60.9	59.4
IBP - D86 DIST.	94	92	88	97	90	104	92
5%	104	108	105	115	106	126	112
10%	119	126	124	130	125	139	130
20%	147	155	151	155	151	159	158
30%	175	182	175	176	180	180	184
50%	220	227	219	211	226	218	241
70%	261	273	264	234	274	253	280
90%	337	356	346	286	352	315	364
95%	363	398	382	343	392	349	408
END POINT	410	440	424	404	434	406	434
W.U.N.	380	393	380	355	390	375	410
VAPOR PRESSURE	8.9	8.9	8.9	8.4	8.9	7.5	8.9
LEAD, g/gal.	0.002	0.000	0.011	0.012	0.012	0.006	0.013
SULPHUR, ppm	233	481	579	88	549	202	576
PHOSPHORUS, g/gal.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MANGANESE, g/gal.	0.000	0.000	0.000	0.000	0.000	0.000	0.135

ATTACHMENT 3

J-1

BAKERSFIELD AREA

PREMIUM GASOLINE

SEPTEMBER 1976

BRAND	ARCO	MOBIL	PHILLIPS	SHELL	STANDARD	TEXACO	UNION
API GRAVITY	58.9	54.8	53.7	54.5	51.3	55.5	56.8
IBP - D86 DIST.	91	90	96	96	106	100	95
5%	113	107	115	114	124	114	111
10%	130	123	134	127	137	128	124
20%	154	151	156	154	167	148	145
30%	177	181	179	184	192	175	171
50%	227	236	222	241	234	229	224
70%	274	287	260	293	280	285	280
90%	340	354	316	357	332	352	354
95%	368	380	368	384	354	376	383
END POINT	409	418	410	430	408	430	424
U.U.N.	387	400	376	409	398	397	391
VAPOR PRESSURE	8.3	8.6	7.4	8.5	8.4	8.9	8.7
LEAD, g/gal.	3.72	3.05	3.34	3.31	2.60	3.31	3.47
SULPHUR, ppm	15	122	124	66	24	82	116
PHOSPHORUS, g/gal.	0.000	0.000	0.000	0.000	0.000	0.000	0.000

BAKERSFIELD SEPTEMBER 1981

UNLEADED GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO	UNION
API Gravity @ 60°F	49.9	52.4	54.9	55.5	53.2	56.1
D86 Dist. - IBP	92	94	88	88	92	98
5%	110	116	109	107	108	119
10%	131	135	126	120	123	140
20%	162	159	146	142	153	143
30%	188	183	164	166	182	187
50%	243	226	215	215	233	224
70%	290	275	273	276	281	263
90%	336	334	327	351	338	335
95%	374	363	369	377	369	365
End Point	405	405	408	406	404	415
W.U.N.	420	404	386	392	407	404
F.I.A. % A	47.0	42.0	39.5	34.5	42.5	34.0
% O	0.5	0.5	5.5	9.5	3.5	2.5
% S	52.5	57.5	55.0	56.0	54.0	63.5
Vapor Pressure, psi	8.4	8.3	8.0	7.9	8.9	7.5
Lead, g/gal	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur, ppm	24	8	305	324	395	141
T V/L Ratio @ 20:1, °F	155.0	146.3	144.2	146.9	141.5	151.4
Research Octane	92.5	92.4	92.7	92.6	92.2	95.9
Motor Octane	82.8	83.1	83.0	82.9	82.7	86.4
Oleylamine, #/MB	----------	----------	----------	----------	----------	7.5

BAKERSFIELD SEPTEMBER 1981

PREMIUM GASOLINE

Brand	ARCO	CHEVRON	MOBIL	SHELL	TEXACO	UNION
Type	Unleaded	Unleaded	Unleaded	Unleaded	Unleaded	Leaded
API Gravity @ 60°F	47.8	55.2	55.3	55.2	50.5	56.5
D86 Dist. - IBP	86	92	92	91	87	92
5%	106	110	120	115	114	114
10%	123	132	139	133	134	127
20%	153	172	165	160	164	146
30%	182	192	190	186	192	165
50%	242	229	225	223	238	214
70%	292	265	264	268	285	272
90%	351	318	335	334	340	336
95%	381	353	363	369	389	362
End Point	438	413	422	404	424	413
W.U.N.	420	400	405	400	417	389
F.I.A. % A	54.5	36.0	36.0	37.0	47.5	33.5
% O	0.5	9.0	2.5	4.5	3.0	9.5
% S	45.0	55.0	61.5	58.5	49.5	57.0
Vapor Pressure, psi	7.9	(7.0)	7.6	8.4	8.0	7.9
Lead, g/gal	<0.001	0.13	<0.001	<0.001	<0.001	2.18
Sulfur, ppm	15	71	114	189	25.	1060
T V/L Ratio @ 20:1, °F	150.5	149.0	152.8	149.7	149.7	143.2
Research Octane	97.0	96.4	96.3	96.7	96.7	96.6
Motor Octane	86.0	85.7	86.3	86.2	85.6	86.7
Oleylamine, #/MB	----------					14.9

SUPER 76 GASOLINE

	SPEC SHEET	B-100526	B-100528	B-100532	B-100534	B-100528	B-100514	B-100532	B-100519	B-100512
TANK NUMBER		2165	2293	2271	2294	2306	2330	2358	2422	2458
SAMPLE NUMBER	G-2	02-26-73	02-26-73	03-01-73	03-04-73	03-05-73	03-06-73	03-08-73	03-10-73	03-11-73
DATE BLEND COMPLETED	DATED	39.5	29.6	34.6	69.1	44.5	39.5	59.3	39.6	39.5
BARRELS BLENDED	02/06/73	ML	ML	H	H	ML	ML	H	ML	ML
GRADE								9.96	5.90	
U80 UNIFINING C5/C6		6.80	7.45	14.78	14.92	9.14	9.14	9.67	7.40	8.94
U81SUL LT CAT GASO		28.58	39.24	35.26	56.59	21.39	62.00	54.53	48.93	61.26
U80 REFORMATE		16.85	0.88	13.98	4.99	4.45	12.65	5.15	6.45	
U91 ICS			4.29					6.90	8.54	
MLB ALKY GASO			2.79			4.30		2.79	3.97	2.85
BLENDING BUTANE		20.96	31.33	13.97	18.65	23.40	13.68	6.81	10.87	25.85
U120 LT UNICRACKATE		23.26	10.61	10.28	3.43	19.32			6.19	
U80 REFORMATE		3.87	3.87	3.60	1.39	0.99	2.51	4.14	1.70	1.08
U80 UNIF HVY CAT GASO						21.96				
U-110 MOTOR ALKY										
GRAVITY API 60F		55.8	55.5	55.9	54.2	59.6	54.5	55.7	56.1	54.4
CORROSION 3 HOURS 122F	1 MAX			1A						
VAPOR PRESS REID 100F PSI	SPEC/RESULT	90MX86	126MX76	90MX86	90MX68	90MX89	90MX81	90MX84	90MX89	90MX76
V/L RATIO	22 MAX	122T15	122T0	130T5	130T0	122T1	122T1	130T2	122T1	122T0
30 DAY AVERAGE	20 MAX	17	16	8	6	14	14	4	13	12
GUMS SOLV WASHED MG/100 ML	4.0 MAX			0.2						
GUMS ISU MG/LITER				1.1						
ISU RATING	100 MAX			16						
OXIDATION STAB MINUTES	240 MIN			780						
DIACO NUMBER	45 MAX			21						
AROMATICS FIA VOLUME PCT				0.55						
OLEFINS NUMBER G/100G	28 MAX	36.3	35.6	39.2	42.1	26.0	43.5	40.8	36.0	39.8
SULFUR WEIGHT PCT	0.15 MAX	8	7	15	15	5	10	11	8	9
MERCAPTAN SULFUR PPM	4.0 MAX			0.02				0.01-		
LEAD CONT TOTAL G/GAL CALC	4.00 MAX	1.4	1.4	1.5	1.6	1.4	1.01	0.6	0.8	0.7
LEAD CONT TML G/GAL CALC		2.46	2.61	2.86	2.19	2.37	1.47	2.28	1.77	1.90
KM MOTOR INT COMP RESULT		1.98	2.08	2.29	1.79	1.80	1.14	1.83	1.44	1.51
KM RESEARCH INT COMP RES	99.2 MIN 1a	91.44	91.36	91.34	90.86	92.03	90.37	91.18	91.22	90.79
10 DAY AVERAGE	99.5 MIN 2a	99.01	99.01	99.59	99.51	99.00	99.00	99.50	99.09	99.00
ROAD RATING CALC	99.0 MIN	99.10	99.09	99.50	99.51	99.03	99.02	99.52	98.99	98.99
30 DAY AVERAGE	99.3 MIN	99.92	99.91	99.54	99.66	99.34	99.50	100.10	99.66	99.80
MAX DEGREES F	432 MAX	99.68	99.69	99.72	99.70	99.62	99.61	99.74	99.56	99.57
RECOVERY PCT	95 MIN 3a	416	419	418	387	394	402	426	395	370
RESIDUE PCT	2.0 MAX	96.8	97.5	97.0	98.0	97.5	97.5	97.5	96.8	96.8
MAX DEGREES F - 30 DAY AVE	430 MAX	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10PCT EVAPORATED DEG F	SPEC/RESULT	408	409	411	404	406	400	409	403	401
PCT EVAP AT 100F		147MX113	147MX135	147MX119	147MX140	147MX124	147MX129	147MX135	147MX123	147MX136
PCT EVAP AT 210F		39	31	38.0	38.0	33.0	34.0	32.0	32.0	30.0
PCT EVAP AT 250F		46.5	45	46.0	43.5	45.5	45.0	45.5	43.5	44.0
PCT EVAP AT 300F	70 MIN	57.5	65	60.0	64.5	67.0	650	62.0	64.0	66.5
VAPR LK FACTOR	SPEC/RESULT	76	84	80	88	84	90	88	88	91
30 DAY AVERAGE	SPEC/AVE	135MN103	135MN101	135MN104	135MN138	135MN106	135MN104	135MN100	135MN100	135MN101
		100MN102	100MN102	100MN105	100MN103	100MN102	100MN102	100MN101	100MN102	100MN102

1a NO RESEARCH SPEC. FOR I GRADE.
1a SPEC. FOR RL GRADE 98.7 MIN.
2a NO RESEARCH SPEC. FOR I GRADE.
2a SPEC FOR RL GRADE 99.0 MIN
3a DOES NOT APPLY TO C GRADE.

DISTRIBUTION: GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY

ATTACHMENT X

X-1

454 SUPER 76 GASOLINE

BLEND NUMBER			334	337	342	347	350	355	359	363	368
TANK NUMBER	SPEC SHEET		B 510	B532	B 524	B 530	B 510	B 532	B524	B530	B510
SAMPLE NUMBER	G-2/G-3/G-4		4014	4047	4101	4173	4200	4271	4292	4355	4408
DATE BLEND COMPLETED	DATED		09/26/82	09/29/82	10/03/82	10/07/82	10/10/82	10/15/82	10-18-82	10-21-82	10/26/82
BARRELS BLENDED	1-6-81		73.5	68.9	78.5	78.6	78.4	78.3	78.4	68.9	83.1
GRADE			M	M	M	M	M	M	M	M	M
UNIFINED C5/C6			9.82	11.11	32.70	37.00	19.78	39.15	19.77	36.67	44.71
UNISOL LT CAT GASO			4.65					7.86			
CHAMPLIN REFORMATE			16.26	12.92		12.03	15.08	8.36	26.84	16.84	
U80 REFORMATE				10.81		26.28					
ICS			4.82	7.14		0.37					
U110 LITE ALKY								0.78			
BLENDING BUTANE				2.57				0.45	2.98	3.91	5.24
U120 LT UNICRACKATE			35.46	15.48	29.39	18.47	33.99	9.13	19.96		18.36
U60 REFORMATE			5.11	13.10	14.07	3.84	18.75			19.64	39.78
U60 UNIF HVY CAT GASO							2.81		32.15		
U100 REFORMATE			23.89	27.67	23.84		10.39	34.67		25.54	
GRAVITY API 60 F.			57.4	52.2	60.1	58.8	56.8	57.9	54.9	58.6	61.2
VAPOR PRESS REID	SPEC/RESULT		08MX73	08MX86	08MX87	08MX84	08MX87	08MX85	08MX87	08MX86	11MX109
30 DAY AVERAGE	SPEC/RESULT		08MX85	08MX86	08MX86	08MX85	08MX86	08MX85	08MX86	08MX85	11MX109
V/L RATIO	22 MAX		13417	13476	133111	13478	13375	13478	13376	13476	12Q714
30 DAY AVERAGE	20 MAX		8	9	9	8	8	7	7	7	9
GUMS EXISTENT MG/100 ML	4.0 MAX				0.4						
ISO RATING	100 MAX				39						
OXIDATION STAB. MINUTES	240 MIN				1440						
BROMINE NUMBER G/100G	28 MAX	1•	6	2	1	3	2	12	2	2	1
SULFUR WEIGHT PCT	0.10 MAX				<0.01						
MERCAPTAN SULFUR PPM	6.0 MAX		1.5	0.6	0.8	0.9	0.0	1.5	0.6	2.6	2.0
LEAD CONT TOTAL G/GAL CALC	0.00 MAX		1.09	0.69	1.47	1.70	1.35	1.50	1.15	1.81	1.83(3)
OCTANE NO (R+M)/2	92.0/92.2 MIN	2•	92.03	92.27	92.03	92.24	92.01	92.22	92.01	92.22	92.03
30 DAY AVERAGE	92.0/92.2 MIN		92.03	92.21	92.03	92.24	92.02	92.23	92.02	92.24	92.02
EP DEGREES F	432 MAX		380	396	390	388	414	360	416	398	396
RECOVERY VOL PCT	95.0 MIN	3•	96.0	98.0	98.0	98.0	98.5	98.0	97.0	98.0	98.0
RESIDUE VOL PCT	2.0 MAX		1.0	1.06	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EP 30 DAY AVERAGE	430 MAX		391	390	388	398	393	385	399	385	404
10% EVAP DEGREES F	SPEC/RESULT		149MX128	149MX130	149MX127	149MX128	149MX128	149MX131	149MX129	149MX137	140MX110
50% EVAP DEGREES F	170 MIN SPEC MAX		240MX198	240MX234	240MX195	240MX195	240MX201	240MX196	240MX220	240MX227	243MX190
90% EVAP DEGREES F	SPEC/RESULT		374MX316	374MX332	374MX320	374MX317	374MX345	374MX302	374MX345	374MX329	365MX334
WARM UP NUMBER	SPEC/RESULT		425MX366	432MX409	432MX364	432MX364	432MX379	432MX361	432MX399	432MX404	412MX368
30 DAY AVERAGE	SPEC/RESULT		432MX393	425MX397	425MX377	425MX391	425MX377	425MX385	425MX380	425MX390	405MX360

1• APPLIES TO M AND ML GRADES ONLY
2• SUPER NOC ARE 92.0. SUPER M IS 92.2.
3• DOES NOT APPLY TO C GRADE

DISTRIBUTION - GEN.SUPT.,OPER, SUPT. R.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY,2

455

REGULAR 76 GASOLINE

BLEND NUMBER			089	091	094	095	096	099	101	103	106
TANK NUMBER	SPEC SHEET		8538	8526	8542	8514	8536	8538	8526	8542	8 512
SAMPLE NUMBER	6-401		1184	1186	1215	1265	1237	1272	1289	1297	1323
DATE BLEND COMPLETED	DATE=		03-25-81	03-27-81	03-29-81	03-30-81	03-31-81	04-02-81	04-04-81	04-05-81	04/08/81
BARRELS BLENDED	11-15-80		68,9	73,9	68,8	83,7	39,8	4438	73,9	44,8	44,2
GRADE			M	M	M	M	M	M	M	M	M
UNLEADED C5/C6			2,68						5,49	2,27	6,85
UNISOL LT CAT GASO			22,55	29,40	11,74	26,47	26,58	24,83	23,03	26,11	25,96
U33 AVIA BASE STOCK					6,81						
CHAMPLIN REFINMATE					25,92	5,21	20,77		6016		8,39
U80 REFINMATE			31,81	32,01	23,08	39,60	30,59	34,63	23,31	15,86	
IC5							1,30				
U110 LITE ALKY			6,96	6,72							
BLENDING BUTANE			5,07	4,85	5,79	4,70	3,81	4,99	4,40	4,83	3,98
U60 REFORMATE			8,47	15,77		6,52	3,02	11,06	14,26	16,57	25,11
U60 UNIF HVY CAT GASO											1,14
MOTOR ALKY			22,97	11,25	27,76	17,40	9,92	24,48	21,37	34,36	28,57
GRAVITY API 60 F.			60,8	56,7	56,6	56,5	58,5	57,5	56,5	61,5	58,6
COMBUSTION 3 HOURS 112 F	1 MAX							1A			
VAPOR PRESS REID	SPEC/RESULT		90MX90	90MX90	90MX88	90MX88	90MX89	90 MX 86	90 MX 88	90 MX 88	90 MX 86
30 DAY AVERAGE	SPEC/RESULT		90MX88	90MX89	90MX86	90MX85	90MX88	90 MX 88	90 MX (87)	90 MX 87	90 MX 87
V/L RATIO	22 MAX		12@17	12@12	13318	125 T 3	125 T 2	125 T 2	125 T 2	133 T 11	125 T 2
30 DAY AVERAGE	20 MAX		4	2	6,8	2	3,6	3,2	2,7	8,5	3
GUMS EXISTENT MG/100 ML	4,0 MAX							V,6			
ISO RATING	100 MAX							68			
OXIDATION STAB MINUTES	240 MIN		630	555	1110	600.	720	600	840	690	1050
DIAZO NUMBER	45 MAX							17			
BROMINE NUMBER G/100G	28 MAX	1@	18	21	11	20	21	19	17	20	19
SULFUR PPM	400 MAX		130	141	104	140	127	116	109	132	131
MERCAPTAN SULFUR PPM	6,0 MAX		2,4	1,9	1,0	1,4	1,5	<0,1	<0,1	0,5	2,2
LEAD, GM/GAL	0,02 MAX		<0,005	<0,005	<0,005	<0,005	<0,005	<0,005	<0,005	<0,005	<0,005
LEAD, GM/GAL (TANK)	0,02 MAX		<0,005	<0,005	<0,005	<0,005	<0,005	<0,005	<0,005	<0,005	<0,005
MOTOR OCTANE	84,5 MIN		85,00	84,53	85,15	84,52	84,73	84,75	84,53	84,84	84,52
30 DAY AVERAGE	84,5 MIN		84,93	84,53	84,69	84,52	84,89	84,86	84,53	84,77	84,53
OCTANE NO (R+M)/2	89,0 MIN		89,54	89,46	89,54	89,50	89,96	89,62	89,26	89,51	89,22
30 DAY AVERAGE	89,0 MIN		89,53	89,48	89,57	89,45	89,62	89,62	89,30	89,58	89,29
EP DEGREES F	432 MAX		387	401	400	388	401	696	410	400	422
RECOVERY VOL PCT	95,0 MIN	2@	96,5	97,0	96,0	97,5	97,0	97,5	97,5	97,0	97,0
RESIDUE VOL PCT	2,0 MAX		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
EP 30 DAY AVERAGE	430 MAX		400	405	418	403	400	399	402	416	404
10% EVAP DEGREES F	SPEC/RESULT		140MX125	140MX132	149MX139	140MX122	140MX125	140MX127	140MX128	140MX129	140MX127
50% EVAP DEGREES F	170 MIN SPEC MAX		203MX217	203MX232	206MX233	203MX230	203MX229	203MX230	203MX227	203MX221	206MX222
90% EVAP DEGREES F	SPEC/RESULT		365MX324	365MX340	374MX325	365MX326	365MX327	365MX330	365MX339	365MX358	374MX356
RAMP UP NUMBER	SPEC/RESULT		412MX404	412MX410	412MX409	412MX399	412MX400	412MX403	412MX403	412MX397	412MX404
30 DAY AVERAGE	SPEC/RESULT		405MX398	405MX395	405MX394	405MA395	405MX398	405MX399	405MX397	405MX396	405MX398

1@ APPLIES TO M AND ML GRADES ONLY
2@ DOES NOT APPLY TO C GRADE

DISTRIBUTION = GEN.SUPT.OPER, SUPV.PROD.ENGRG, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

455 REGULAR 76 GASOLINE

BLEND NUMBER			109	109	111	115	116	117	118	120	121
TANK NUMBER	SPEC SHEET		81701	526	4548	4538	4529	4542	5512	4546	4540
SAMPLE NUMBER	6-84		1429	1442	1476	1508	1560	1578	1609	1662	1688
DATE BLEND COMPLETED	DATED		04-05-80	04-06-80	04-05-80	04-12-80	04-15-80	04-16-80	04-16-80	04-16-80	04-17-80
BARRELS BLENDED	02-15-79		98,6	83,9	74,8	85,7	85,9	85,6	85,9	83,5	83,5
GRADE			C	M	M	M	M	M	M	M	M
UNIFINED CS/C6				14,94	11,89	12,89	12,84	27,11	10,18		7,91
UNISOL LT CAT GASO			25,91	19,65	22,57	20,88		22,43		23,13	22,54
U80 REFORMATE			45,47	12,5	41,87	20,74	19,02	9,07	1,55	18,48	46,24
BLENDING BUTANE			11,21	2,46	4,41	4,03	2,95	1,78	1,91	2,01	3,33
U120 LT UNICRACKATE			15,29	1,81		7,21	28,38		35,87	27,36	9,11
U60 REFORMATE						21,47	5,95		5,93		
U60 UNIF HVY CAT GASO			0,11	2,93	3,81		2,11		,56	4,74	5,19
MOTOR ALKY				25,55	13,55		11,53	26,39	11,69		
U100 REFORMATE				14,94		13,17	17,27	13,22	12,28	24,42	7,65
GRAVITY API 60 F			57,0	60,4	55,5	52,8	56,4	63,1	57,7	55,3	52,8
VAPOR PRESS REID	SPEC/RESULT		13AMX12A	90MX85	90MX89	90MX88	90MX86	90MX80	90MX86	90MX89	90MX83
30 DAY AVERAGE	SPEC/RESULT		135MX12A	90MX85	90MX87	90MX86	90MX86	90MX86	90MX86	90MX26	90MX85
V/L RATIO	22 MAX		11AT1A	12ST1	13STA	12ST1	12ST1	13ST12	12ST1	12ST3	13ST7
30 DAY AVERAGE	20 MAX		1A	1	6	1	1	7	1	1	7
OXIDATION STAB MINUTES	240 MIN		510	960	360	480	1440	480	1440	660	315
BROMINE NUMBER G/100G	28 MAX	1*	2A	2A	25	23	3	26	1	2A	23
SULFUR PPM	400 MAX		307	231	242	<10	231	275	<10	25A	232
MERCAPTAN SULFUR PPM	6.0 MAX		1.5	0.9	1.7	1.3	1.5	0.9	1.0	0.8	<0.1
LEAD, GM/GAL	0.02 MAX		<.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
LEAD, GM/GAL (TANK)	0.02 MAX			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MOTOR OCTANE	84.0 MIN		84,09	84,08	84,07	84,07	84,04	84,03	84,08	84,07	84,07
30 DAY AVERAGE	84.0 MIN		84,07	84,05	84,06	84,06	84,04	84,05	84,06	84,06	84,06
OCTANE NO (R+M)/2	88.0 MIN		89,35	88,87	89,18	89,56	88,20	88,62	88,15	89,36	89,44
30 DAY AVERAGE	88.0 MIN		89,14	88,94	89,03	89,02	88,94	88,97	88,88	88,92	89,04
EP DEGREES F	432 MAX		426	427	430	414	415	369	402	413	414
RECOVERY VOL PCT	95,0 MIN	2*	95,0	97,0	97,5	98,0	98,0	99,0	98,0	97,0	97,5
RESIDUE VOL PCT	2,0 MAX		1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
EP 30 DAY AVERAGE	430 MAX		427	407	424	413	413	416	413	413	415
10% EVAP DEGREES F	SPEC/RESULT		131MX101	140MX129	140MX133	140MX131	140MX132	140MX133	140MX135	140MX129	140MX137
50% EVAP DEGREES F	170 MIN SPEC MAX		23AMX211	243MX205	243MX224	243MX239	243MX222	243MX197	243MX217	243MX215	243MX232
90% EVAP DEGREES F	SPEC/RESULT		365MX326	365MX316	365MX334	365MX340	365MX330	365MX295	365MX321	365MX325	365MX331
WARM UP NUMBER	SPEC/RESULT										
30 DAY AVERAGE	RESULT		37A	37A	401	417	397	360	390	387	409
			37A	391	405	398	39A	39A	400	399	398

1* APPLIES TO M AND ML GRADES ONLY
2* DOES NOT APPLY TO C GRADE

DISTRIBUTION = GEN.SUPT.OPER, SUPV.PROC.ENGRG, SUPT. R.D., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

LOS ANGELES REFINERY PROD S REPORT

REG 76 GASO (UNLEADED)

TANK NUMBER	SPEC SHEET	8204	378	B100514	B100542	B100512	8-204	B100540	B100542	B100512
SAMPLE NUMBER	G-8	1509	1528	1566	1609	1647	1748	1772	1823	1834
DATE BLEND COMPLETED	DATED	02-28-75	03-02-75	03-04-75	03-06-75	03-09-75	03-12-75	03-13-75	03-18-75	03-19-75
BARRELS BLENDED	03-01-74	69.2	39.8	54.6	74.5	39.8	65.0	69.7	84.4	84.0
GRADE		C	I	ML	H	ML	C	H	ML	ML
U80 UNIFINED C5/C6						5.64	11.98			
UNISOL LT CAT GASO		25.20	5.44	27.67	25.26	9.15		20.54	17.05	21.19
U33 AVIA BASE STOCK			7.48							
U80 REFORMATE		55.40	22.59	22.39	12.16	29.94		5.42	24.05	32.16
U91 IC5			14.40		3.46	16.75	12.24	4.57	9.86	7.08
BLENDING BUTANE		14.55	10.20	5.01	1.92	6.89	11.32	2.66	2.72	2.48
U120 LT UNICRACKATE			7.95	1.93	2.71			1.27		
U60 UNIF HVY CAT GASO		3.31	5.36	0.58	1.50	4.72	4.98	1.92	3.67	1.12
U-110 MOTOR ALKY		1.51						16.27		7.20
U100 REFORMATE			26.53	42.39	52.95	26.86	59.45	47.32	42.62	28.73
GRAVITY API 60F		56.6	57.9	52.9	52.2	56.0	56.2	59.8	53.7	55.4
CORROSION 3 HOURS 122F	1 MAXIMUM		1A	1A						
VAPOR PRESS REID LBS	SPEC/RESULT	147MX134	123MX122	93MX85	93MX74	129MX118	145MX151	93MX84	93MX91	93MX84
V/L RATIO	22 MAX	112T18	124T25	122T1	130T10	122T20	112T17	130T4	122T3	122T1
30 DAY AVERAGE	20 MAX	20	19	8	14	9	18	11	5	5
GUMS SOLV WASHED MG/100 ML	4.0 MAX		0.2							
GUMS ISD MG/LITER			3.3							
ISD RATING	100 MAX		59							
OXIDATION STAB MINUTES	240 MIN		1440+							
DIAZO NUMBER	45 MAX		7							
BROMINE NUMBER G/100G	28 MAX 3*			27	25	10		20	18	23
SULFUR WEIGHT PCT	0.15 MAX		0.01-							
MERCAPTAN SULFUR PPM	6.0 MAX	0.9	1.1	1.3	1.2	1.3	0.5	1.1	1.0	1.2
LEAD. GM/GAL	0.02 MAX	0.005	0.005	0.005	0.005	0.005	0.007	0.005	0.005	0.005
LEAD. GM/GAL (TANK)				0.005	0.005	0.005		0.005	0.005	0.005
ROAD RATING CALC	91.2 MIN	91.57	91.73	91.50	91.52	91.58	91.48	91.59	91.51	91.52
30 DAY AVERAGE	91.5 MIN	91.51	91.58	91.52	91.54	91.52	91.53	91.55	91.53	91.55
OCTANE NO. (R+M)/2	88.5 MIN	90.85	90.28	91.20	91.13	90.21	89.57	90.64	90.83	90.91
30 DAY AVERAGE	89 MIN	89.86	90.39	90.25	90.56	90.35	90.10	90.54	90.62	90.68
MAX DEGREES F	432 MAX 4*	422	426	376	391	432	432	379	413	381
RECOVERY PCT	95 MIN 2*	95.0	97.0	97.0	97.5	97.0	97.0	97.0	97.0	98.0
RESIDUE PCT	2.0 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX 4*	411	395	410	384	412	412	389	410	404
10PCT EVAPORATED DEG F	SPEC/RESULT	140MX97	150MX114	150MX133	150MX136	150MX108	150MX104	150MX132	150MX128	150MX130
PCT EVAP AT 180F		36.5	35.0	32.0	31	38.5	42.0	34.0	37.5	33.5
PCT EVAP AT 210F		45.5	45.0	46.0	45	48.0	53.0	52.0	49.5	46.5
PCT EVAP AT 250F		61.0	65.0	66.5	67	65.0	73.0	78.0	67.5	67.0
PCT EVAP AT 330F	70 MIN	82	86	90	90	84	90	93	88	89
WARM UP FACTOR	135-190	143	146	144	143	152	168	164	154	147
30 DAY AVERAGE	140-185	151	148	142	144	142	152	148	145	145

21 tank

M. D. RIEHLE

APR 8 1975

2* DOES NOT APPLY TO C GRADE
3* APPLIES TO H AND ML GRADES ONLY
4* MAX 446 APPLIES TO I GRADE ONLY

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

K-5

REG 76 GASO (LOW-LEAD)

TANK NUMBER	SPEC SHEET	B-100510	B-100538	B-100536	B-100522	B-100524	B-100538	B-100522	B-378	100536
SAMPLE NUMBER	G-4	2028	2059	2154	2222	2264	2287	2296	2310	2356
DATE BLEND COMPLETED	DATED	02-20-73	02-21-73	02-25-73	02-27-73	03-01-73	03-04-73	03-05-73	03-06-73	03-07-73
BARRELS BLENDED	07/01/72	34.6	34.6	29.6	54.3	34.6	59.2	29.7	29.7	39.6
GRADE		ML	H	ML	ML	ML	H	ML	I	ML
U90 UNIFINED C5/C6			10.89	1.97	1.07	0.46		9.68	21.49	9.96
U/ISOL LT CAT GASO		22.22	19.24	13.62	13.82	14.50	22.75	13.90	23.74	26.75
U33 AVIA BASE STOCK			9.61				7.43		6.16	
MLB ALKY GASO		6.15								
BLENDING BUTANE		2.22	3.99	8.86	9.16	9.30		9.64	7.46	0.37
U120 LT UNICRACKATE		31.48		33.40	33.67	30.91	27.93	19.59		21.76
U80 REFORMATE		21.04	37.29	35.61	35.09	35.58	21.43	41.82	21.15	21.52
U60 UNIF HVY CAT GASO		3.32	2.08	3.40	3.38	3.41	0.99	0.99	1.02	2.73
U-110 MOTOR ALKY		9.14	11.77	3.51	3.76	5.81	19.44	8.85	18.93	16.88
U110 IC4		4.39	5.08							
GRAVITY API 60F		63.9	59.4	59.9	60.6	60.8	63.3	60.1	66.4	63.4
CORROSION 3 HOURS 122F	1 MAXIMUM					1A				
VAPOR PRESS RCID 100F PSI	SPEC/RESULT	191MX116	129MX120	129MX116	129MX117	129MX115	90MX70	129MX117	118MX109	90MX77
V/L RATIO	22 MAX	118T21	129T18	122T18	122T20	122T16	130T1	122T20	129T19	122T1
30 DAY AVERAGE	20 MAX	20	8	19	19	19	7	20	17	17
GUMS SOLV WASHED MG/100 ML	4.0 MAX					0.2				
GUMS ISD MG/LITER						2.1				
ISD RATING	100 MAX					27				
OXIDATION STAB MINUTES	240 MIN					660				
DIAZO NUMBER	45 MAX					21				
NAPHTHALENES FTM VOL PCT						0.74				
BROMINE NUMBER G/100G	28 MAX	22	19	13	13	15	23	15		26
SULFUR WEIGHT PCT	0.15 MAX					0.02				
MERCAPTAN SULFUR PPM	6.0 MAX	1.9	1.6	1.2	0.9	1.3	2.8	2.1	1.3	1.5
TEL G/GAL CALCULATED	0.60MAX 3*	0.54	0.53	0.57	0.54	0.54	0.54	0.55	0.49	0.49
KR MOTOR INT COMP RESULT		85.52	85.42	85.66	85.54	85.55	85.53	85.48	85.42	85.19
KR RESEARCH INT COMP RES	93.5 MIN 1*	93.99	93.93	93.84	93.78	93.78	93.85	93.70	93.47	93.93
30 DAY AVERAGE	93.8 MIN 1*	93.84	94.07	93.85	93.83	93.82	93.98	93.81	92.34	93.82
ROAD RATING CALC	91.4 MIN 4*	91.80	91.72	91.90	91.81	91.42	91.80	91.76	91.72	91.54
30 DAY AVERAGE	91.7 MIN 4*	92.06	91.74	92.05	92.03	92.01	91.77	91.96	92.11	91.86
MAX DEGREES F	432 MAX	410	408	417	421	420	395	403	400	413
RECOVERY PCT	95 MIN 2*	96.0	95.5	960	97.0	97.5	98.0	97.0	97.0	97.5
RESIDUE PCT	2.0 MAX	1.0	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX	417	409	417	417	418	403	417	406	417
10PCT EVAPORATED DEG F	SPEC/RESULT	140MX108	140MX111	140MX104	150MX106	150MX112	150MX136	150MX106	150MX113	150MX126
PCT EVAP AT 180F		49.5	36.0	43	42.0	41.0	42.0	40.0	49.0	46.5
PCT EVAP AT 210F		63	47.0	52	52.0	52.0	59.5	50.0	63.0	60.5
PCT EVAP AT 250F		76	60.0	63	63.5	65.0	77.0	62.0	76.0	74.5
PCT EVAP AT 300F	70 MIN	88	74.0	79	79	77	87	75	86	85
WARM UP FACTOR	135-190	186	143	158	158	158	178	152	188	182
30 DAY AVERAGE	140-185	159	159	160	160	160	163	160	178	164

1* NO RESEARCH SPEC. FOR I GRADE
2* DOES NOT APPLY TO C GRADE
3* I GRADE SPEC. 0.5 MAX., TT-607, 9-20-72
4* SPEC. CHANGE PER LETTER B-291, 11-14-72

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

493 REGULAR 76 GASOLINE

TANK NUMBER	SPEC SHEET	B-378	B-100522	B-100536	B-60001	B-100524	B384/385	B-100538	B-100524	B-100510
SAMPLE NUMBER	G-4	1818	1832	1840	1923	1964	3035	3088	3096	3223
DATE BLEND COMPLETED	DATED	02-10-72	02-12-72	02-13-72	02-17-72	02-20-72	02-22-72	02-25-72	02-27-72	03-01-72
BARRELS BLENDED	09/29/71	24.7	24.7	29.6	49.5	24.7	34.5	74.2	69.2	44.4
GRADE		J	PL	ML	H	ML	C	H	ML	ML
U80 UNIFINED CS/C6		22.58	8.51	6.89					14.83	12.14
UNISOL LT CAT GASO		18.63	19.75	20.39	23.29	22.17	24.38	21.23	20.53	23.80
U33 AVIA BASE STOCK			9.42	8.14	5.62	1.81		11.43	8.51	4.18
U00 REFORMATE		1504	4.69							
U91 IC5		2.25	2.98	2.98						
ML8 ALKY GASO			5.24					20.93		3.52
BLENDING BUTANE		0.99	4.98	5.42			9.22			
U120 LT UNICRACKATE			4.39	4.87	15.91	22.22	19.59	10.59		
U00 REFORMATE		28.65	30.99	31.72	29.18	31.60	38.49	27.29	33.31	36.57
U80 UNIF HVY CAT GASO		5.58	6.02	6.36	7.34	7.14	5.52	6.45	4.75	5.06
U-110 MOTOR ALKY		6.24		6.77	17.60	13.11			10.03	14.70
BUTANE-BUTENE				3.42	1.01	1.84	2.77	2.05		
U110 IC4			2.98	2.98						
GRAVITY API 60F		58.2	58.9	59.0	58.8	58.2	59.3	58.2	58.7	57.2
CORROSION 3 HOURS 122F	1 MAXIMUM									1A
VAPOR PRESS REID 100F PSI	SPEC/RESULT	121MX115	141MX126	141MX129	80MX76	90MX84	145MX140	80MX75	90MX90	90MX84
V/L RATIO	22 MAX	124T19	118T18	118T18	130T1	122T0	112T20	130T1	122T1	122T1
30 DAY AVERAGE	20 MAX	19	19	19	17			13	11	9
GUMS SOLV WASHED MG/100 ML	4.0 MAX				1.2					0.2
GUMS ISO MG/LITER										2.2
ISO RATING	100 MAX									26
OXIDATION STAB MINUTES	240 MIN									420+
DIACO NUMBER	45 MAX									46
NAPHTHALENES FTH VOL PCT										0.7
BROMINE NUMBER G/100G	28 MAX		19	20	19	21		21	19	22
SULFUR WEIGHT PCT	0.15 MAX									0.03
MERCAPTAN SULFUR PPM	6.0 MAX	1.1	1.2	1.2	1.8	1.6	1.0	1.3	0.9	1.0
TEL G/GAL CALCULATED	0.5 MAX	0.50	0.496	0.491	0.50	.50	0.38	0.50	0.50	0.50
KR MOTOR INT COMP RESULT		85.49	85.41	85.43	85.39	85.44	85.07	85.42	85.42	85.46
KR RESEARCH INT COMP RES	93.5 MIN	94.88	94.20	94.46	94.37	94.43	94.56	94.24	93.09	94.50
30 DAY AVERAGE	93.8 MIN	94.54	94.56	94.55	94.52	94.49		94.47	94.39	94.38
ROAD RATING CALC	91.9 MIN	92.27	92.21	92.23	92.20	92.23	179.63	92.22	92.22	92.25
30 DAY AVERAGE	92.2 MIN	92.25	92.25	92.25	92.24	92.24		92.25	92.25	92.25
MAX DEGREES F	432 MAX	427	419	417	427	430	422	424	429	421
RECOVERY PCT	95 MIN	96.5	96.0	96.0	96.5	98.0	97.0	97.5	98.0	97.0
RESIDUE PCT	2.0 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
MAX DEGREES F - 30 DAY AVE	430 MAX	426	425	425	425	425.51		424	425	425
10PCT EVAPORATED DEG F	SPEC/RESULT	140MX105	140MX107	140MX104	150MX135	150MX130	150MX97	150MX141	147MX129	147MX130
PCT EVAP AT 180F		40.0	38.0	40.0	32	35.0	40.5	30.5	33.0	30.0
PCT EVAP AT 210F		48.0	49.0	49.5	44	47.5	48.5	45.5	45.0	41.5
PCT EVAP AT 250F		59.0	61.0	61.5	62	62.0	58.5	64.0	61.0	56.5
PCT EVAP AT 300F	70 MIN	73	74	75	76	74	72	78	76	72
WARM UP FACTOR	135-175 1•	147	148	151	140	144	148	140	139	128-131
30 DAY AVERAGE	140-170 1•	152	151	151	150	150		146	145	143

•1 PER TT-66, 2-3-72, MINIMUM VUF SPECS. REDUCED 5
NUMBERS FOR PERIOD 3-1 TO 4-15-72

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER LABORATORY 2

REGULAR 76 GASOLINE [illegible]

BLEND NUMBER	15	18	20	25	30	31	34
T...K NUMBER	1012	1012	1005	1012	241	1012	1012
DATE COMPLETED	2-12-71	2-15-71	2-20-71	2-27-71	3 -6-71	3 -7-71	3-11-71
BARRELS BLENDED	48414..	58652.	72969.	38622.	29329.	24393.	53398.
GRADE OF BLEND	LC	LC	LW	LC	LW	LC	LC
V/L TEMPERATURE	112.	112.	112.	112.	122.	112.	112.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	13.7	15.3	11.3	11.9	0.0	21.7	25.7
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C3-C6	20.1	23.4	25.1	23.3	33.1	23.2	23.0
L.S.T.P.	49.9	46.1	49.4	50.1	48.7	46.7	45.3
BUTANE	8.0	8.2	7.6	8.3	0.0	3.4	3.0
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	8.3	7.0	6.6	6.3	18.1	4.9	3.0
TOTAL	100.0	100.0	100.0	99.9	99.9	99.9	100.0
BLEND QUALITY							
GRAVITY API	60.2	60.5	60.1	59.9	58.3	59.7	59.1
R.V.P.	12.5	12.7	12.0	11.7	7.2	10.7	9.5
V/L RATIO	8.8	9.7	6.8	4.4	0.2	5.4	0.8
30 DAY AVE	4.6	6.4	6.5	7.5	6.7	6.6	5.5
10 PCT POINT	104.0	103.0	104.0	107.0	129.0	113.0	112.0
MAX DEG.F BLEND	412.0	400.0	404.0	409.0	428.0	418.0	418.0
30 DAY AVE	416.2	412.7	410.5	405.5	408.2	409.1	410.5
.U.F. BLEND	152.8	164.2	165.1	159.0	148.7	163.4	161.6
30 DAY AVE	148.6	152.6	155.7	161.0	159.5	159.9	160.2
EVAP. AT 300 F	82.6	84.3	83.5	82.3	81.0	82.0	81.9
RECOVERY PCT	95.0	95.3	96.0	96.0	97.0	96.9	96.2
RESIDUE PCT	1.3	1.3	1.5	1.5	1.4	1.4	1.3
RSH PPM	2.000	1.600	1.800	1.900	1.400	2.100	2.600
30 DAY AVE	1.827	1.892	1.869	1.808	1.760	1.790	1.922
CURR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.43	0.44	0.44	0.48	0.44	0.51	0.53
KRR BLEND	94.30	95.00	94.80	95.10	94.10	95.40	95.50
30 DAY AVE	94.69	94.55	94.61	94.79	94.71	94.77	94.89
KRM BLEND	85.10	85.20	84.90	85.10	85.10	84.80	84.60
ROAD OCT. BLEND	92.70	93.00	92.70	92.90	92.60	92.90	92.80
30 DAY AVE	92.98	92.88	92.84	92.81	92.79	92.80	92.80
...D. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.60	0.40	0.40	0.40	0.40	0.40
SULFUR	0.000	0.000	0.000	0.000	0.000	0.065	0.000

SUPER 76 GASOLINE — SAN FRANCISCO REFINERY — PRODUCTS REPORT

BLEND NUMBER	24	23	29	35	38	44	43A
TANK NUMBER	243	242	1004	1004	1004	243	242
DATE COMPLETED	2-26-71	3 -4-71	3 -4-71	3-14-71	3-19-71	3-25-71	3-27-71
BARRELS BLENDED	24803.	29566.	19584.	50719.	44191.	19703.	42280.
GRADE OF BLEND	W	W	C	C	C	W	W
V/L TEMPERATURE	122.	122.	112.	122.	112.	122.	122.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAR ALKYLATE	4.6	0.0	0.0	0.0	0.0	0.0	0.0
LAR REFORMATE	7.2	7.7	9.1	8.5	9.1	11.4	6.9
BUTANE	6.8	0.0	6.1	6.4	5.0	0.9	2.0
L.S.T.P.	42.6	48.4	49.7	49.0	49.2	48.7	49.9
C5-C6	9.6	0.0	10.0	9.2	10.4	0.0	0.0
LT. WAXY GASO.	10.3	14.3	11.2	12.9	11.5	12.5	15.1
LT. CAT.	18.8	29.6	13.9	13.9	13.8	26.5	26.1
TOTAL	99.9	100.0	100.0	99.9	100.0	100.0	100.0
BLEND QUALITY							
GRAVITY API	57.9	54.6	56.4	55.1	55.2	55.5	54.7
R.V.P.	11.2	7.5	10.3	9.8	10.6	8.5	8.5
V/L RATIO	13.8	0.2	6.2	7.6	1.2	1.1	0.8
30 DAY AVE	9.1	8.0	7.9	8.6	7.4	6.9	6.0
10 PCT POINT	107.0	132.0	115.0	116.0	115.0	123.0	127.0
MAX DEG.F BLEND	408.0	419.0	412.0	424.0	414.0	418.0	415.0
30 DAY AVE	406.3	407.8	408.1	411.2	411.7	414.6	414.7
W.U.F. BLEND	152.3	144.4	146.4	140.0	141.9	146.2	146.4
30 DAY AVE	154.5	153.3	152.8	149.1	147.9	145.9	146.0
EVAP. AT 300 F	82.4	80.8	80.8	78.7	79.7	82.0	81.7
RECOVERY PCT	96.0	97.1	96.2	96.2	96.0	96.6	96.9
RESIDUE PCT	1.4	1.4	1.5	1.3	1.5	1.3	1.5
RSH PPM	2.900	1.200	1.200	1.600	1.700	2.200	1.500
30 DAY AVE	1.629	1.579	1.552	1.434	1.478	1.630	1.518
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	3.75	4.00	3.96	3.87	3.94	3.96	3.99
PCT TML	77.38	78.10	76.35	77.27	80.75	71.97	80.40
KRR BLEND	99.70	99.60	99.60	99.50	99.70	100.00	99.90
30 DAY AVE	99.47	99.48	99.49	99.51	99.54	99.59	99.64
KRM	91.00	89.90	90.50	90.70	91.00	90.10	90.40
ROAD OCTANE BLND	99.20	98.50	98.80	98.90	99.40	99.19	98.90
30 DAY AVE	99.08	99.01	98.99	98.86	98.95	98.94	98.93
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.20	0.20	1.20	0.80	0.80	0.60	0.40
SULFUR	0.040	0.050	0.050	0.040	0.050	0.050	0.050

REGULAR 76 GASOLINE HC & HW SAN FRANCISCO REFINERY PRODUCTS REPORT

END NUMBER	33	39	40	47	50	60	61
TANK NUMBER	1010	1010	1006	1010	1006	1010	1006
DATE COMPLETED	3-10-71	3-20-71	3-21-71	4 -1-71	4 -4-71	4-19-71	4-20-71
BARRELS BLENDED	24197.	41111.	20523.	39042.	52546.	17642.	19237.
GRADE OF BLEND	HW	HW	HW	HW	HC	HW	HC
V/L TEMPERATURE	122.	122.	122.	132.	122.	132.	122.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	26.8	25.9	26.0	25.0	24.5	22.2	22.0
C5-C6	27.6	23.5	25.2	22.5	19.0	24.2	24.0
L.S.T.P.	45.6	44.1	43.4	50.8	51.5	53.5	54.0
BUTANE	0.0	6.5	5.4	1.7	5.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	100.0	100.0	100.0	99.9	100.0
BLEND QUALITY							
GRAVITY API	59.1	59.0	59.4	58.5	59.0	58.3	58.2
R.V.P.	9.8	9.5	10.1	8.7	10.5	7.5	9.7
V/L RATIO	4.4	5.5	6.0	10.0	7.8	5.5	4.3
30 DAY AVE	3.8	4.4	4.5	6.9	6.6	7.2	7.4
10 PCT POINT	117.0	117.0	114.0	119.0	114.0	125.0	117.0
MAX DEG.F BLEND	418.0	422.0	408.0	404.0	423.0	408.0	421.0
30 DAY AVE	410.8	414.0	413.5	413.8	415.3	415.0	413.9
W.U.F. BLEND	165.7	167.0	169.2	165.0	164.6	154.5	160.0
30 DAY AVE	166.8	166.3	166.5	165.6	166.2	164.7	163.5
EVAP. AT 300 F	82.5	83.0	83.8	83.9	82.3	80.2	82.7
RECOVERY PCT	96.5	96.2	96.2	96.9	96.7	96.5	96.5
RESIDUE PCT	1.4	1.3	1.5	1.2	1.5	1.5	1.4
RSH PPM	1.500	1.500	1.800	2.200	2.100	2.100	2.000
30 DAY AVE	1.531	1.462	1.487	1.701	1.853	1.942	2.071
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.07	2.17	1.98	1.91	1.90	1.77	1.75
KRR BLEND	94.10	94.20	94.20	94.40	94.30	94.50	94.50
30 DAY AVE	94.05	94.08	94.09	94.14	94.20	94.30	94.30
KRM BLEND	86.50	86.20	86.40	86.60	86.00	86.20	86.10
LEAD OCT. BLEND	93.00	92.90	93.00	93.10	92.80	93.00	92.90
30 DAY AVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.40	0.40	0.20	0.60	0.20	0.40	0.40
SULFUR	0.044	0.000	0.050	0.000	0.040	0.000	0.030

REGULAR 75 GASOLINE BLEND SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	37	41	42	45	46	48	54
TANK NUMBER	1005	1005	241	1005	1005	1005	1012
DATE COMPLETED	3-17-71	3-22-71	3-23-71	3-26-71	3-28-71	3-31-71	4 -9-71
BARRELS BLENDED	48775.	38971.	19511.	38934.	24010.	32979.	43593.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	122.	122.	122.	122.	122.	132.	132.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	17.1	23.6	0.0	0.0	0.0	0.0	14.1
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	26.5	20.5	30.4	32.6	32.2	31.1	23.4
L.S.T.P.	46.9	46.3	50.6	49.5	49.8	51.0	51.3
BUTANE	3.9	4.0	1.7	0.1	0.4	1.3	0.0
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	5.6	5.6	17.3	17.8	17.6	15.6	11.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	99.9
BLEND QUALITY							
GRAVITY API	59.7	59.4	58.8	59.2	59.0	59.1	58.2
R.V.P.	9.8	10.4	8.3	7.7	7.5	7.9	8.0
V/L RATIO	6.3	7.3	1.2	0.4	0.2	2.8	2.8
30 DAY AVE	5.2	4.6	3.8	3.3	3.1	2.9	2.9
10 PCT POINT	113.0	112.0	124.0	123.0	128.0	127.0	129.0
MAX DEG.F BLEND	413.0	416.0	425.0	415.0	403.0	404.0	428.0
30 DAY AVE	410.7	413.4	417.0	416.7	415.7	415.3	415.7
M.U.F. BLEND	161.2	168.0	150.2	156.4	151.5	147.0	152.2
30 DAY AVE	161.4	161.7	159.9	159.4	158.8	157.5	157.1
EVAP. AT 300 F	82.1	83.5	81.5	83.0	83.0	82.2	81.2
RECOVERY PCT	97.2	96.0	96.7	97.0	97.3	97.2	97.2
RESIDUE PCT	1.5	1.5	1.3	1.5	1.5	1.1	1.1
RSH PPM	2.600	2.400	1.800	1.700	1.800	1.300	2.300
30 DAY AVE	2.012	2.141	2.213	2.144	2.118	2.058	2.15
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.50	0.37	0.37	0.53	0.49	0.43	0.41
KRR BLEND	95.10	95.30	94.50	94.30	94.90	94.00	95.10
30 DAY AVE	95.01	95.05	95.08	94.97	94.97	94.85	94.91
KRM BLEND	84.80	84.60	85.30	85.30	85.70	85.30	85.00
ROAD OCT. BLEND	92.80	92.80	92.90	92.80	93.20	92.70	92.90
30 DAY AVE	92.81	92.77	92.80	92.80	92.83	92.81	92.84
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.00	0.20	0.20	0.20	0.00	0.00	0.40
SULFUR	0.000	0.000	0.000	0.000	0.000	0.060	0.000

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

.D NUMBER	120	122	125	131	133	140A	143
TANK NUMBER	1005	1012	1005	1012	1005	1012	1005
DATE COMPLETED	7-27-71	7-30-71	8 -4-71	8-12-71	8-18-71	8-28-71	8-31-71
BARRELS BLENDED	41134.	72593.	78822.	83803.	67396.	93226.	65372.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	21.3	21.4	11.3	14.2	11.6	0.0	0.0
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	22.3	22.3	23.1	40.2	0.0	24.1	25.0
.S.T.P.	34.5	34.6	30.8	36.1	47.2	45.0	43.0
BUTANE	2.2	2.2	3.1	3.4	0.8	2.8	2.5
BUK	0.0	0.0	2.0	4.1	35.0	8.4	9.4
.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	11.8	11.7	27.7	0.0	5.4	19.7	20.1
L" "LATE	7.8	7.9	2.0	0.0	0.0	0.0	0.0
TOTAL	99.9	100.1	100.0	100.0	100.0	100.0	100.0
BLEND QUALITY							
GRAVITY API	57.7	57.8	55.5	56.0	56.9	54.0	54.5
R.V.P.	8.7	8.7	6.0	8.5	8.3	8.7	8.7
V/L RATIO	15.6	15.6	13.4	15.2	19.6	14.0	19.1
30 DAY AVE	15.6	15.6	15.3	14.8	15.7	15.3	15.9
0 PCT POINT	124.0	124.0	123.0	123.0	122.0	123.0	129.0
AX DEG.F BLEND	426.0	419.0	417.0	415.0	424.0	423.0	428.0	
30 DAY AVE	417.9	418.2	423.8	418.2	419.3	419.5	421.0
.0.F. BLEND	157.3	152.3	143.8	148.6	155.4	137.9	141.5
30 DAY AVE	159.6	157.9	153.0	149.4	150.6	146.9	145.0
VAP. AT 300 F	80.9	80.8	82.6	82.0	77.4	79.3	78.1
ECOVERY PCT	97.0	97.0	97.0	97.0	96.9	97.0	97.0
ESIDUE PCT	1.7	1.7	1.5	1.3	1.5	1.5	1.9
SH PPM	1.500	1.800	1.800	2.400	3.500	1.000	1.200
30 DAY AVE	1.351	1.454	1.579	1.937	2.243	2.028	1.931
ORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EAD GR/GAL	0.49	0.50	0.45	0.48	0.49	0.49	0.48
RR BLEND	95.40	95.40	95.40	95.30	94.90	95.10	94.90
DAY AVE	95.02	95.11	95.34	95.36	95.27	95.22	95.19
BLEND	84.90	84.80	85.00	84.80	85.40	85.60	85.40
OCT. BLEND	92.90	92.90	93.00	92.80	93.00	93.20	93.00
30 DAY AVE	92.96	92.95	92.95	92.89	92.91	92.98	93.00
XID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UMS.EX.MG/100ML	0.80	0.60	0.00	0.80	0.40	0.40	0.60
ULFUR	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SUPER 76 GASOLINE — SAN FR... — PRODUCTS REPORT

BLEND NUMBER	91	92	97	101	105	112	115A
..K NUMBER	1004	242	1004	1004	1004	1004	1004
DATE COMPLETED	6 -1-71	6 -2-71	6 -8-71	6-15-71	6-25-71	7 -5-71	7-13-71
BARRELS BLENDED	39628.	22893.	32356.	33898.	35544.	56122.	25259.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LAR ALKYLATE	0.0	0.0	0.0	0.0	0.0	16.7	3.2
LAR REFORMATE	20.8	15.1	18.2	16.5	18.0	0.0	24.6
BUTANE	3.2	3.5	3.7	4.2	3.2	3.5	3.2	
..S.T.P.	42.7	45.6	44.3	46.8	45.2	46.6	36.4
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	23.8	26.1	25.1	21.2	22.2	21.6	16.7
LT. CAT.	9.5	9.7	8.7	11.4	11.3	11.6	12.8
LUN	0.0	0.0	0.0	0.0	0.0	0.0	3.0
TOTAL	100.0	100.0	100.0	100.1	99.9	100.0	99.9
BLEND QUALITY							
GRAVITY API	53.4	53.4	53.3	54.2	54.3	58.0	55.1
R.V.P.	8.8	8.7	6.5	8.9	7.0	8.8	8.6
V/L RATIO	12.5	11.9	12.7	15.0	14.6	15.4	12.0
30 DAY AVE	7.3	7.6	8.4	10.1	13.3	14.5	14.5
10 PCT POINT	127.0	125.0	129.0	119.0	123.0	128.0	127.0
MAX DEG.F BLEND	411.0	416.0	424.0	414.0	406.0	406.0	426.0
30 DAY AVE	424.5	423.9	423.2	421.1	414.6	411.4	411.1
N.U.F. BLEND	133.9	134.9	133.5	141.0	134.4	130.4	135.4
30 DAY AVE	131.3	131.6	130.6	131.8	134.0	134.2	134.5
EVAP. AT 300 F	82.0	81.5	81.7	82.5	83.6	83.5	81.9
RECOVERY PCT	96.9	96.5	96.9	95.0	96.0	97.0	96.0
RESIDUE PCT	1.4	1.5	1.4	1.5	1.4	1.5	1.6
RSH PPM	1.900	0.800	0.900	3.400	1.600	1.000	1.200
30 DAY AVE	1.172	1.146	1.099	1.315	1.620	1.629	1.714
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	3.89	3.87	3.76	3.85	3.85	3.74	3.89
PCT TML	79.80	80.79	79.89	79.71	80.07	79.89	80.57
KRR BLEND	99.50	99.50	99.60	99.60	99.50	99.50	99.60
30 DAY AVE	99.55	99.54	99.54	99.55	99.59	99.54	99.53
KRM	91.50	91.50	91.20	91.30	91.20	91.40	91.90
P..D OCTANE BLND	100.20	100.10	100.60	100.00	99.80	100.10	99.97
..0 DAY AVE	99.97	99.98	100.05	100.09	100.11	100.11	99.98
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.00	1.00	1.00	1.00	0.00	0.20	1.00
SULFUR	0.020	0.020	0.010	0.020	0.030	0.020	0.028

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SUPER 76 GASOLINE SAN FRANCISCO REFINERY PRODUCTS REPORT

END NUMBER	57	59	61	66	69	74	76
TANK NUMBER	1004	1004	1004	1004	1004	1004	1004
DATE COMPLETED	3-25-72	3-27-72	3-31-72	4 -4-72	4 -7-72	4-16-72	4-20-72
BARRELS BLENDED	69587.	48764.	59455.	19857.	48694.	49821.	65482.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LUK	37.9	38.1	38.4	3.6	32.8	27.1	27.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	23.9	24.2	23.4	39.2	12.4	23.5	25.5
BUTANE	1.3	0.5	0.9	3.4	0.3	1.7	1.6
L.S.T.P.	36.9	37.1	37.2	21.6	49.9	25.5	24.3
C5-C6	0.0	0.0	0.0	0.0	0.0	20.2	21.6
LT. WAXY GASO.	0.0	0.0	0.0	32.1	4.7	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	99.9	99.9	100.1	100.0	100.0
BLEND QUALITY							
GRAVITY API	56.0	55.5	56.2	54.1	55.2	57.9	58.6
R.V.P.	8.7	8.2	8.0	8.5	8.2	6.4	9.0
V/L RATIO	7.8	2.2	6.0	3.6	8.2	12.8	12.8
30 DAY AVE	4.6	4.4	4.9	4.6	5.5	6.3	8.1
10 PCT POINT	122.0	122.0	121.0	136.0	131.0	121.0	121.0
MAX DEG.F BLEND	413.0	415.0	419.0	406.0	421.0	407.0	407.0
30 DAY AVE	409.6	410.1	412.4	411.1	413.4	412.3	413.0
W.U.F. BLEND	145.7	146.7	147.2	131.6	138.5	169.7	170.0
30 DAY AVE	145.1	145.2	146.4	145.5	143.8	146.5	152.0
EVAP. AT 300 F	79.6	81.2	79.9	81.5	78.1	83.3	85.6
RECOVERY PCT	96.5	96.5	97.0	96.9	97.0	97.0	97.5
RESIDUE PCT	1.4	1.3	1.2	1.4	1.4	1.2	0.9
RSH PPM	1.000	0.900	0.000	0.500	0.600	2.000	3.200
30 DAY AVE	0.702	0.721	0.652	0.662	0.650	0.814	1.276
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.48	2.40	2.50	3.48	3.49	3.81	3.94
PCT TML	80.69	78.77	79.89	79.59	88.88	80.66	81.38
KRR BLEND	99.50	99.50	99.51	99.51	99.51	99.50	99.52
30 DAY AVE	99.51	99.51	99.51	99.50	99.50	99.50	99.50
RM	93.12	92.54	92.65	92.12	92.46	92.93	92.15
OAD OCTANE BLND	101.42	101.17	101.22	101.08	101.23	100.84	99.80
30 DAY AVE	101.14	101.14	101.21	101.19	101.23	101.19	100.99
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.20	0.40	0.60	0.20	0.60	0.20	0.00
SULFUR	0.001	0.001	0.003	0.003	0.006	0.038	0.043

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	75	78	82A	84	90	94	99
TANK NUMBER	1001	1001	1001	1005	1005	1001	1005
DATE COMPLETED	4-17-72	4-23-72	4-30-72	4-30-72	5-5-72	5-10-72	5-17-72
BARRELS BLENDED	38777.	41791.	62616.	19209.	57808.	64267.	63870.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.

COMPOSITION (VOL. PCT.)

LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	0.0	0.0	1.3	0.0	0.0	0.0	14.0
C5-C6	10.2	11.2	18.4	20.2	23.1	21.4	0.0
L.S.T.P.	30.0	30.8	21.0	24.6	21.1	20.1	12.8
BUTANE	0.0	0.0	3.9	0.0	2.9	3.1	3.5
LUK	21.9	21.2	13.7	13.6	15.0	15.1	19.8
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	37.9	36.7	41.8	41.6	38.0	40.3	44.3
L.U.N.	0.0	0.0	0.0	0.0	0.0	0.0	5.6
TOTAL	100.0	99.9	100.1	100.0	100.1	100.0	100.0
	67.9	68.5	61.9	66.2	59.1	60.1	57.1

BLEND QUALITY

GRAVITY API	52.5	53.0	53.6	53.5	54.5	54.6	54.4
R.V.P.	6.5	7.2	8.8	9.1	8.5	8.6	8.7
V/L RATIO	1.0	0.8	5.0	1.0	5.8	5.8	3.6
30 DAY AVE	2.1	1.7	2.7	2.6	3.2	3.9	3.8
10 PCT POINT	131.0	133.0	130.0	126.0	124.0	124.0	134.0
MAX DEG.F BLEND	407.0	406.0	410.0	404.0	400.0	396.0	392.0
30 DAY AVE	389.2	391.4	406.5	406.2	404.9	403.4	401.3
W.U.F. BLEND	130.4	131.3	129.2	131.1	140.3	140.5	133.5
30 DAY AVE	131.4	131.5	128.3	128.6	131.1	134.6	134.4
EVAP. AT 300 F	82.2	82.0	79.3	80.3	80.8	82.1	83.0
RECOVERY PCT	97.0	97.0	97.0	96.5	96.3	96.5	97.0
RESIDUE PCT	1.4	1.5	1.2	1.2	1.4	1.4	1.3
RSH PPM	2.000	1.800	1.800	2.000	1.000	1.400	1.400
30 DAY AVE	1.774	2.033	2.117	2.106	1.867	1.587	1.553
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.50	0.43	0.47	0.48	0.44	0.48	0.47
KRR BLEND	96.77	96.62	96.79	96.45	96.54	96.88	96.71
30 DAY AVE	96.72	96.80	96.73	96.71	96.67	96.70	96.61
KRM BLEND	86.08	86.11	86.13	86.15	86.06	86.09	86.01
10 OCT. BLEND	92.72	92.74	92.76	92.77	92.71	92.73	92.67
30 DAY AVE	92.71	92.71	92.73	92.73	92.73	92.73	92.72
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.60	0.40	0.40	0.20	0.00	0.00	0.00
SULFUR	0.030	0.038	0.033	0.015	0.027	0.027	0.028

REGULAR 76 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	111	113	117	118	124	128	131
TANK NUMBER	241	1010	241	1010	1006	1010	1006
DATE COMPLETED	5-31-72	6 -4-72	6 -6-72	6 -7-72	6-16-72	6-20-72	6-22-72
BARRELS BLENDED	28840.	25165.	19298.	45607.	48194.	35774.	29005.
GRADE OF BLEND	HC	HW	HC	HW	HW	HW	HW
V/L TEMPERATURE	127.	140.	127.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	0.0	0.0	0.0	1.4	0.0
LT. WAXY GASO.	0.0	28.4	22.8	29.8	27.3	28.6	46.4
C5-C6	23.3	15.6	26.4	20.5	25.0	25.0	0.0
L.S.T.P.	50.3	54.7	37.5	45.6	44.8	43.8	49.3
BUTANE	5.8	0.0	5.6	0.0	1.7	1.3	2.7
LUN	20.6	1.4	0.0	0.0	1.2	0.0	1.7
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	7.7	4.1	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.1	100.0	100.0	100.0	100.1	100.1
BLEND QUALITY							
GRAVITY API	61.0	55.7	60.5	56.7	58.9	58.7	57.4
R.V.P.	10.8	7.5	10.4	7.6	8.4	8.7	8.5
V/L RATIO	16.4	5.2	16.2	6.0	19.0	17.5	15.2
30 DAY AVE	8.5	8.0	8.2	8.2	8.4	8.8	8.9
10 PCT POINT	113.0	136.0	115.0	132.0	126.0	126.0	129.0
MAX DEG.F BLEND	417.0	424.0	420.0	425.0	414.0	416.0	412.0
30 DAY AVE	418.6	420.0	420.0	420.3	420.1	419.8	419.6
W.U.F. BLEND	156.9	128.6	153.7	141.3	153.2	155.5	143.1
30 DAY AVE	155.5	153.8	153.7	153.4	153.2	153.9	153.6
EVAP. AT 300 F	82.7	75.9	79.9	82.4	80.6	80.4	79.1
RECOVERY PCT	96.0	97.3	96.5	97.2	97.0	97.0	96.1
RESIDUE PCT	1.2	1.5	1.9	1.6	1.2	1.2	1.5
RSH PPM	1.000	1.500	1.000	1.300	1.300	2.800	2.000
30 DAY AVE	1.630	1.632	1.619	1.612	1.615	1.660	1.682
CORK.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.15	2.72	2.19	2.83	2.84	2.73	2.97
KRR BLEND	93.81	93.82	93.80	93.81	93.80	93.82	93.89
30 DAY AVE	93.81	93.81	93.81	93.81	93.81	93.81	93.81
KRM BLEND	87.30	86.85	87.03	87.30	87.25	86.81	88.28
AD OCT. BLEND	93.95	93.61	93.75	93.95	93.91	93.57	94.69
30 DAY AVE	94.44	94.35	94.34	94.33	94.32	94.31	94.33
ANTID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.60	0.00	0.40	0.40	0.40	0.40	0.60
SULFUR	0.023	0.027	0.024	0.033	0.042	0.030	0.015

REGULAR 76 GASOLINE HC + HW SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	148	151	156	0161	0163	169	176
TANK NUMBER	241	1010	241	1006	1010	1006	1010
DATE COMPLETED	7-15-72	7-17-72	7-23-72	7-26-72	7-30-72	8-4-72	8-10-72
BARRELS BLENDED	14660.	23529.	53656.	38558.	49806.	28733.	50025.
GRADE OF BLEND	HC	HW	HC	HW	HW	HW	HW
V/L TEMPERATURE	127.	140.	127.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	0.0	0.0	0.0	10.6	0.0
LT. WAXY GASO.	9.4	15.5	22.7	19.9	24.4	39.8	33.9
C5-C6	20.9	22.9	19.9	23.6	16.8	0.0	17.3
L.S.T.P.	50.2	50.3	43.0	46.9	50.2	48.1	46.9
BUTANE	7.0	2.3	5.4	2.2	2.6	1.0	1.8
LUN	12.5	9.0	8.9	7.5	6.0	0.4	0.0
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	99.9	100.1	100.0	99.9	99.9
BLEND QUALITY							
GRAVITY API	59.2	57.0	58.9	57.8	57.3	57.8	57.8
R.V.P.	10.6	8.6	10.7	8.8	7.2	8.4	8.5
V/L RATIO	16.4	14.0	16.0	15.6	14.4	14.2	15.4
30 DAY AVE	15.8	15.1	15.0	15.1	14.8	14.8	15.0
10 PCT POINT	114.0	126.0	114.0	125.0	129.0	132.0	127.0
MAX DEG.F BLEND	420.0	426.0	419.0	421.0	423.0	419.0	428.0
30 DAY AVE	417.3	418.4	419.4	419.6	421.4	421.1	421.8
D.U.F. BLEND	142.8	137.0	151.8	141.8	139.3	142.0	146.5
30 DAY AVE	144.7	142.8	142.9	142.7	142.1	142.3	143.8
EVAP. AT 300 F	78.0	77.2	80.5	78.1	78.2	79.5	79.1
RECOVERY PCT	96.0	96.8	96.7	96.0	96.6	97.1	96.5
RESIDUE PCT	1.5	1.2	1.3	1.3	1.3	1.4	1.5
RSH PPM	2.600	1.800	1.000	2.600	2.200	0.600	1.900
30 DAY AVE	1.518	1.572	1.285	1.433	1.590	1.569	1.725
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.22	2.84	2.81	3.03	2.93	2.80	3.07
RR BLEND	93.80	93.80	93.81	93.82	93.81	93.79	93.81
30 DAY AVE	93.82	93.83	93.82	93.82	93.82	93.80	93.80
RM BLEND	87.05	87.36	87.20	87.08	87.47	87.25	87.58
AD OCT. BLEND	93.76	93.99	93.87	93.78	94.08	93.91	94.18
0 DAY AVE	93.81	93.81	93.76	93.76	93.83	93.88	93.93
XID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UMS.EX.MG/100ML	0.40	0.00	0.40	0.40	0.20	0.00	0.00
ULFUR	0.025	0.036	0.029	0.030	0.030	0.012	0.015

REGULAR 76 GASOLINE LC+LW SAN FRANCISCO REFINERY PRODUCTS REPORT

END NUMBER	174	177	180	182	188	191	194
TANK NUMBER	288	1001	287	288	1001	1002	287
DATE COMPLETED	8 -8-72	8-12-72	8-15-72	8-19-72	8-24-72	8-30-72	9 -2-72
BARRELS BLENDED	49726.	50435.	54040.	52228.	66461.	50099.	49884.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	9.1	0.0	0.0	2.7	9.6	3.5	13.0
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.S.T.P.	17.5	24.7	24.2	28.7	28.8	38.7	39.3
BUTANE	2.2	3.1	2.4	2.5	1.3	2.5	2.2
LUK	24.3	25.4	26.4	25.9	26.2	25.9	22.9
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	38.8	33.7	34.8	32.0	31.8	22.9	22.6
L.U.N.	8.1	13.1	12.2	8.1	2.2	6.4	0.0
TOTAL	100.0	100.0	100.0	100.0	99.9	99.9	100.0
BLEND QUALITY							
GRAVITY API	55.1	55.1	55.1	55.0	54.8	54.5	54.8
R.V.P.	8.6	8.8	8.7	8.9	8.6	8.8	8.7
V/L RATIO	15.8	17.0	15.6	17.2	14.3	15.5	14.7
30 DAY AVE	15.8	16.0	15.9	16.3	15.9	16.0	16.0
10 PCT POINT	129.0	121.0	129.0	129.0	126.0	130.0	125.0
MAX DEG.F BLEND	390.0	399.0	395.0	422.0	405.0	412.0	417.0
30 DAY AVE	395.0	393.3	393.5	393.7	395.6	400.2	403.0
W.U.F. BLEND	139.0	138.9	138.7	127.0	142.0	131.5	134.9
30 DAY AVE	133.8	135.1	135.4	136.2	137.3	138.4	137.6
EVAP. AT 300 F	83.0	81.4	81.8	76.3	81.4	77.8	79.1
RECOVERY PCT	96.7	95.0	96.0	97.0	97.3	96.0	0.0
RESIDUE PCT	1.3	1.1	1.3	1.2	1.3	1.5	1.3
RSH PPM	0.800	0.400	0.900	1.400	1.800	1.400	1.000
30 DAY AVE	0.922	0.909	0.908	0.947	1.112	1.177	1.178
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.45	0.49	0.37	0.46	0.50	0.45	0.50
30 DAY AVE	0.45	0.46	0.45	0.45	0.46	0.45	0.46
KRR BLEND	94.70	95.31	95.23	94.73	94.12	94.41	94.64
30 DAY AVE	96.11	96.17	96.09	95.81	95.48	95.14	94.91
M BLEND	86.10	86.07	86.06	86.06	86.05	86.11	86.09
AD OCT. BLEND	92.74	92.71	92.70	92.70	92.70	92.75	92.73
30 DAY AVE	92.71	92.72	92.72	92.72	92.71	92.71	92.71
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS.EX.MG/100ML	0.00	0.40	0.40	0.00	0.40	0.80	0.00
SULFUR	0.013	0.007	0.004	0.005	0.003	0.005	0.010

SUB - REGULAR C + A — SAN FRANCISCO REFINERY — PRODUCTS REPORT

BLEND NUMBER	175	181	185A	192	199	200	204
TANK NUMBER	60	1002	1003	1003	1003	1003	60
DATE COMPLETED	8-13-72	8-18-72	8-27-72	8-30-72	9-12-72	9-16-72	9-24-72
BARRELS BLENDED	30908.	54037.	64782.	29503.	58137.	31635.	40879.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	140.	140.	140.	140.	140.	132.	132.
COMPOSITION (VOL. PCT.)							
L.S.T.P.	34.2	50.6	47.7	48.7	48.9	48.6	55.6
LT. WAXY GASO.	42.9	35.0	20.0	27.1	0.0	0.0	5.3
C5-C6	0.0	6.6	13.0	21.9	14.8	15.3	14.3
LSN	21.1	7.9	19.4	0.0	32.5	32.7	20.7
BUTANE	1.8	0.0	0.0	2.2	3.8	3.3	2.6
LSK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.1	100.1	99.9	100.0	99.9	100.2
BLEND QUALITY							
GRAVITY API	59.7	56.9	57.7	58.2	57.6	57.6	57.0
R.V.P.	8.4	8.1	7.1	7.9	8.8	8.6	8.8
V/L RATIO	14.6	8.4	7.4	12.4	11.9	7.6	4.5
30 DAY AVE	12.5	11.5	9.7	10.0	10.2	9.3	8.7
10 PCT POINT	132.0	130.0	129.0	129.0	134.0	129.0	132.0
MAX DEG.F BLEND	416.0	423.0	422.0	425.0	428.0	429.0	422.0
30 DAY AVE	412.9	415.3	416.2	417.2	423.2	424.9	424.9
W.U.F. BLEND	153.6	136.8	149.9	145.4	135.8	139.7	131.3
30 DAY AVE	143.4	141.9	144.7	144.8	143.3	141.5	140.8
EVAP. AT 300 F	84.5	79.2	81.1	79.5	79.0	80.3	78.5
RECOVERY PCT	96.6	97.0	97.0	97.1	96.5	97.0	96.5
RESIDUE PCT	1.2	1.2	1.3	1.2	1.5	1.2	1.3
RSH PPM	1.200	0.800	1.100	1.300	1.000	1.200	0.400
30 DAY AVE	1.558	1.381	1.148	1.166	1.045	1.045	0.987
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.97	1.60	1.76	1.56	1.70	1.67	1.52
KRR BLEND	91.51	91.51	91.52	91.52	91.52	91.52	91.50
30 DAY AVE	91.51	91.51	91.51	91.51	91.51	91.51	91.51
KRM BLEND	87.05	85.82	84.98	84.57	85.41	85.19	85.70
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	270.00
GUMS.EX.MG/100ML	0.40	0.40	0.40	0.20	0.20	0.20	0.20
SULFUR	0.011	0.013	0.029	0.033	0.020	0.022	0.021

SUPER TVC GASOLINE — [illegible] REFINERY — PRODUCTS REPORT

BLEND NUMBER	190	202	205	214	215	216	229
TANK NUMBER	61	1004	1002	61	1004	242	61
DATE COMPLETED	9 -1-72	9-22-72	9-29-72	10 -9-72	10-11-72	10-12-72	10-23-72
BARRELS BLENDED	35058.	69169.	74471.	19768.	34654.	34653.	24925.
GRADE OF BLEND	W	W	W	C	W	W	C
V/L TEMPERATURE	140.	132.	132.	107.	132.	132.	107.
COMPOSITION (VOL. PCT.)							
LUK	17.0	0.0	0.0	4.3	25.7	17.9	13.3
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	14.7	14.6	16.2	43.2	30.2	24.1
BUTANE	2.0	2.1	1.7	13.2	3.0	2.5	11.3
L.S.T.P.	62.2	49.5	50.4	45.6	0.4	30.0	34.3
C3-C6	18.8	25.0	26.9	20.7	27.6	19.4	16.5
LT. WAXY GASO.	0.0	8.6	6.4	0.0	0.0	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	99.9	100.0	100.0	99.9	100.0	100.0
BLEND QUALITY							
GRAVITY (API)	54.6	53.7	53.2	57.0	55.2	54.9	57.4
R.V.P.	8.7	9.0	8.4	11.3	8.6	(7.2)	12.5
V/L RATIO	15.0	5.6	5.4	2.2	5.5	6.4	6.3
30 DAY AVE	15.1	12.7	8.9	5.0	5.1	5.3	5.3
10 PCT POINT	123.0	123.0	121.0	106.0	127.0	127.0	103.0
MAX DEG.F BLEND	421.0	416.0	409.0	418.0	392.0	414.0	407.0
30 DAY AVE	420.6	419.2	(416.7)	413.0	409.3	410.0	407.4
W.U.F. BLEND	131.8	131.9	133.1	143.3	139.9	142.8	144.2
30 DAY AVE	131.7	132.2	131.6	133.8	134.8	136.0	138.2
EVAP. AT 300 F	76.2	76.9	77.3	78.8	81.1	80.5	79.1
RECOVERY PCT	97.2	95.8	96.0	95.0	97.3	96.2	95.0
RESIDUE PCT	1.2	1.2	1.7	1.2	1.3	1.3	1.2
RSH (PPM)	1.900	1.200	1.000	0.800	1.000	2.500	1.300
30 DAY AVE	1.354	1.458	1.152	1.060	1.049	1.265	1.295
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD (GR/GAL)	3.59	3.79	3.96	3.10	3.52	2.97	2.93
PCT TML	81.31	80.65	80.39	78.62	79.75	76.58	79.95
KRR BLEND	99.50	99.51	99.50	99.51	99.52	99.40	99.53
30 DAY AVE	99.51	99.51	99.50	99.50	99.50	99.49	99.49
KRM	91.90	91.24	91.12	92.13	91.49	91.39	91.79
ROAD OCTANE BLND	100.17	99.93	99.74	100.24	100.50	100.50	100.85
30 DAY AVE	100.47	100.19	99.98	99.88	99.98	100.08	100.23
OXID. STAB. MIN.	270.00	270.00	270.00	270.00	270.00	270.00	270.00
GUMS.EX.MG/100ML	0.20	0.60	0.40	0.40	0.60	0.60	0.20
SULFUR	0.023	0.022	0.027	0.021	0.026	0.026	0.020

SUPER 76 GASOLINE SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	202	205	214	215	216	222	223
TANK NUMBER	1004	1002	61	1004	242	1004	1004
DATE COMPLETED	9-22-72	9-29-72	10 -9-72	10-11-72	10-12-72	10-18-72	10-23-72
BARRELS BLENDED	69169.	74471.	19768.	34654.	34656.	64283.	64502.
GRADE OF BLEND	W	W	C	W	W	W	W
V/L TEMPERATURE	132.	132.	107.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LUK	0.0	0.0	4.3	25.7	17.9	25.4	25.5
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	14.7	14.6	16.2	43.2	30.2	10.7	23.3
BUTANE	2.1	1.7	13.2	3.0	2.5	0.3	1.5
L.S.T.P.	49.5	50.4	45.6	0.4	30.0	50.1	36.2
C5-C6	25.0	26.9	20.7	27.6	19.4	13.5	13.5
LT. WAXY GASO.	8.6	6.4	0.0	0.0	0.0	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	99.9	100.0	100.0	99.9	100.0	100.0	100.0
BLEND QUALITY							
GRAVITY API	53.7	53.2	57.0	55.2	54.9	56.2	56.1
R.V.P.	9.0	8.4	11.8	8.6	7.2	8.8	8.6
V/L RATIO	5.6	5.4	2.2	5.5	6.4	6.2	6.6
30 DAY AVE	12.7	8.9	5.0	5.1	5.3	5.5	5.7
10 PCT POINT	123.0	121.0	106.0	127.0	127.0	121.0	121.0
MAX DEG.F BLEND	416.0	409.0	418.0	392.0	414.0	424.0	406.0
30 DAY AVE	419.2	416.7	413.0	409.3	410.0	413.0	410.8
W.U.F. BLEND	131.9	133.1	143.3	139.9	142.8	143.0	146.2
30 DAY AVE	132.2	131.6	133.8	134.8	136.0	137.5	140.8
EVAP. AT 300 F	76.9	77.3	78.8	81.1	80.5	77.8	79.3
RECOVERY PCT	95.8	96.0	95.0	97.3	96.2	97.0	97.0
RESIDUE PCT	1.2	1.7	1.2	1.3	1.3	1.4	1.5
RSH PPM	1.200	1.000	0.800	1.000	2.500	1.300	0.600
30 DAY AVE	1.458	1.152	1.060	1.049	1.265	1.273	1.142
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	3.79	3.96	3.10	3.52	2.97	2.93	2.77
PCT TML	80.65	80.39	78.62	79.75	76.58	79.70	79.78
KRR BLEND	99.51	99.50	99.51	99.52	99.40	99.00	99.01
30 DAY AVE	99.51	99.50	99.50	99.50	99.49	99.38	99.37
KRM	91.24	91.12	92.13	91.49	91.59	91.56	91.49
OAD OCTANE BLND	99.93	99.74	100.24	100.50	100.60	100.59	100.56
30 DAY AVE	100.19	99.98	99.88	99.98	100.08	100.19	100.33
OXID. STAB. MIN.	270.00	270.00	270.00	270.00	270.00	270.00	270.00
GUMS.EX.MG/100ML	0.60	0.40	0.40	0.60	0.60	0.40	0.40
SULFUR	0.022	0.027	0.021	0.026	0.026	0.022	0.017

SUPER [illegible] GASOLINE [illegible] BLENDING RECIPES [illegible] REPORTS REPORT

BLEND NUMBER	63	69	82	81	83	84	85
[illegible]K NUMBER	243	243	1004	243	1004	243	1004
DATE COMPLETED	3-11-73	3-20-73	3-31-73	4 -1-73	4 -4-73	4 -7-73	4 -9-73
BARRELS BLENDED	29972.	29872.	29382.	29317.	31543.	36801.	53083.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	122.	132.	132.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LUK	30.9	30.3	28.2	30.0	5.1	4.0	4.3
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	42.1	44.5	42.9	44.2	50.0	50.1	49.0
BUTANE	3.0	0.5	5.7	1.1	2.9	1.0	1.5
..S.T.P.	24.1	24.7	23.2	24.7	10.1	12.0	12.5
C5-C6	0.0	0.0	0.0	0.0	31.9	32.8	32.7
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. CAT.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.1	100.0	100.0	100.0	100.0	99.9	100.0
BLEND QUALITY							
GRAVITY API	54.4	53.9	54.9	54.0	56.5	55.0	56.3
.V.P.	8.6	7.2	8.8	7.5	9.5	7.8	8.0
V/L RATIO	2.2	1.4	11.0	1.1	10.8	1.4	2.2
30 DAY AVE	7.8	8.3	6.8	5.8	5.1	4.4	4.7
0 PCT POINT	127.0	135.0	117.0	136.0	124.0	134.0	125.0
AX DEG.F BLEND	384.0	388.0	410.0	394.0	370.0	375.0	364.0
30 DAY AVE	386.9	389.5	391.9	391.4	386.3	386.6	381.2	
.U.F. BLEND	136.9	131.5	151.1	131.2	140.7	139.8	153.6
30 DAY AVE	139.0	138.6	139.2	136.9	136.8	138.2	141.6
VAP. AT 300 F	85.2	84.1	81.1	84.3	83.4	86.3	88.7
ECOVERY PCT	97.0	97.0	97.5	97.0	96.8	97.2	97.1
ESIDUE PCT	1.4	1.4	1.4	1.2	1.2	1.2	1.2
ISH PPM	1.400	1.500	1.000	1.800	0.800	0.300	0.800
30 DAY AVE	1.131	1.095	0.943	1.071	1.184	1.098	1.032
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
EAD GR/GAL	1.70	1.78	1.94	1.83	1.96	2.22	2.54
CT TML	79.74	79.73	72.64	80.05	78.94	79.85	79.72
RR BLEND	99.01	99.01	99.00	99.02	99.00	99.00	99.01
30 DAY AVE	99.01	99.02	99.00	99.00	99.00	99.00	99.00
RM	91.79	91.56	91.54	91.51	91.96	91.70	91.73
[illegible]D OCTANE BLND	100.44	100.49	100.40	100.33	100.51	100.53	100.57
.0 DAY AVE	100.43	100.46	100.46	100.44	100.42	100.45	100.47
XID. STAB. MIN.	270.00	270.00	270.00	270.00	270.00	270.00	270.00
UMS.EX.MG/100ML	0.40	0.20	0.20	0.30	0.60	0.00	0.40
ULFUR	0.003	0.003	0.021	0.002	0.006	0.001	0.001

REGULAR 73 GASOLINE LOW-LW SAN FRANCISCO REFINERY PRODUCTS INVOICE

BLEND NUMBER	80	88	87	89	94	97	96
TANK NUMBER	1001	1001	288	1001	287	288	28
DATE COMPLETED	3-30-73	4-4-73	4-6-73	4-7-73	4-11-73	4-12-73	4-18-73
BARRELS BLENDED	48664.	19532.	40449.	19370.	47921.	29006.	33675.
GRADE OF BLEND	LW	LW	LW	LW	LW	LW	LW
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
L.S.T.P.	51.3	23.7	46.8	30.8	31.5	49.2	34.1
BUTANE	2.4	2.4	2.0	0.0	0.0	1.5	0.0
LUK	30.5	44.7	30.6	46.1	47.7	30.6	48.3
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	15.9	29.2	20.6	23.1	20.7	18.8	17.1
L.U.N.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.1	100.0	100.0	100.0	99.9	100.1	100.1
BLEND QUALITY							
GRAVITY API	58.4	59.7	55.5	59.6	59.8	55.3	58.7
R.V.P.	10.4	10.0	7.6	8.9	8.8	7.5	8.8
V/L RATIO	19.0	18.4	1.8	85.8	11.4	2.2	8.5
30 DAY AVE	7.7	7.7	6.8	12.0	13.3	12.2	13.5
10 PCT POINT	113.0	118.0	132.0	121.0	117.0	128.0	120.0
MAX DEG.F BLEND	407.0	392.0	400.0	388.0	392.0	409.0	398.0
30 DAY AVE	405.0	403.7	403.2	402.2	399.5	400.4	398.6
M.U.F. BLEND	153.6	167.9	135.6	167.9	172.3	133.2	162.1
30 DAY AVE	149.7	149.5	147.5	148.8	152.6	150.8	153.0
EVAP. AT 300 F	81.8	86.0	79.9	85.8	85.1	79.1	83.1
RECOVERY PCT	96.2	96.0	97.5	97.0	97.2	96.6	97.0
RESIDUE PCT	1.4	2.0	1.6	1.5	1.2	0.0	1.4
RSH PPM	1.600	0.700	0.800	1.300	0.800	0.600	1.200
30 DAY AVE	0.838	0.838	0.832	0.863	0.966	0.932	1.022
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.4	1.0
LEAD GR/GAL	0.52	0.55	0.52	0.53	0.54	0.53	0.54
30 DAY AVE	0.52	0.52	0.52	0.52	0.53	0.53	0.55
RAR BLEND	93.81	93.56	93.92	93.83	93.80	94.26	93.85
30 DAY AVE	93.98	93.96	93.95	93.94	93.93	93.96	93.97	93.97
I BLEND	86.80	86.59	86.06	86.98	86.86	86.12	86.83
ROAD OCT. BLEND	93.27	93.16	92.70	93.40	93.30	92.75	93.29
30 DAY AVE	93.02	92.97	92.93	92.96	93.01	92.99	93.04
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.40	0.20	0.20	0.20	0.40	0.40
SULFUR	0.003	0.007	0.002	0.002	0.004	0.007	0.002

EXCHANGE SUB - REG. N SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	90	100	113	125	139	149	161
TANK NUMBER	1003	1010	1010	1003	1003	1003	1003
DATE COMPLETED	4-10-73	4-21-73	5 -3-73	5-18-73	6 -9-73	6-18-73	7 -8-73
BARRELS BLENDED	57776.	24048.	23409.	24083.	23860.	74424.	48206.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	132.	132.	132.	132.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
L.S.T.P.	48.1	54.3	48.9	42.6	47.1	38.0	39.2
LT. WAXY GASO.	51.9	38.2	46.2	54.2	50.3	60.2	59.9
C5-C6	0.0	6.2	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	0.0	1.3	4.9	3.1	2.7	1.9	0.7
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	100.0	100.0	99.9	100.1	100.1	99.9
BLEND QUALITY							
GRAVITY API	59.8	58.0	57.8	58.9	58.6	60.8	60.5
R.V.P.	8.8	8.1	8.7	8.5	8.7	7.1	8.5
V/L RATIO	9.5	4.7	5.4	7.0	16.0	17.2	18.2
30 DAY AVE	6.8	6.9	7.4	5.7	11.4	16.9	17.3
10 PCT POINT	125.0	129.0	131.0	127.0	134.0	131.0	129.0
MAX DEG.F BLEND	413.0	418.0	423.0	412.0	414.0	408.0	400.0
30 DAY AVE	410.4	411.4	416.3	417.6	412.9	409.4	406.3
M.U.F. BLEND	164.9	149.2	140.8	155.0	151.1	166.8	159.5
30 DAY AVE	162.7	161.7	155.9	148.4	153.0	162.9	161.9
EVAP. AT 300 F	83.5	81.2	80.0	82.5	81.5	84.1	84.9
RECOVERY PCT	97.0	96.0	96.8	96.2	97.8	97.1	97.0
RESIDUE PCT	1.3	1.4	1.2	1.3	1.2	1.4	1.1
RSH PPM	1.500	0.800	1.000	1.000	0.400	0.500	0.600
30 DAY AVE	2.021	1.469	1.228	0.932	0.701	0.475	0.516
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	1.67	1.75	1.76	1.98	1.76	2.36	2.39
KRR BLEND	91.10	91.00	91.11	91.03	91.01	91.00	91.01
30 DAY AVE	91.07	91.05	91.07	91.04	91.02	91.00	91.00
KRM BLEND	86.19	86.15	85.98	86.32	86.05	87.17	86.83
R + KRM	177.29	177.15	177.09	177.35	177.06	178.17	177.84
30 DAY AVE	177.11	177.17	177.21	177.19	177.20	177.90	177.88
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.60	0.40	0.40	0.20	0.20	0.40	0.60
SULFUR	0.004	0.001	0.001	0.003	0.001	0.002	0.005

REGULAR 76 GASOLINE UW — SAN FRANCISCO REFINERY — PRODUCTS REPORT

BLEND NUMBER	56	59	63	68	71A	75	78
TANK NUMBER	1002	1002	1001	1001	1001	1001	1001
DATE COMPLETED	3-21-74	3-24-74	3-31-74	4-7-74	4-10-74	4-14-74	4-22-74
BARRELS BLENDED	50090.	35586.	65946.	50027.	42074.	29976.	59800.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	132.	132.	132.	132.	132.	132.	132.
COMPOSITION (VOL. PCT.)							
LAR LT. CAT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	20.1	0.0	0.0	0.0	0.0	0.0	0.0
C5-C6	0.0	0.0	0.0	0.0	20.1	7.6	1.9
L.S.T.P.	0.0	24.0	18.6	15.1	0.0	0.0	15.8
BUTANE	4.3	3.7	3.1	3.2	4.0	3.3	4.1
LUK	9.0	31.3	31.3	32.0	13.2	30.8	29.2
H.S.T.P.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	66.6	40.9	47.0	49.7	62.7	58.3	48.9
TOTAL	100.0	99.9	100.0	100.0	100.0	100.0	99.9
BLEND QUALITY							
GRAVITY API	50.7	52.0	53.4	53.9	53.7	54.1	53.4
R.V.P.	9.1	7.2	8.8	8.8	8.7	9.0	8.7
V/L RATIO	7.6	8.0	5.3	6.2	8.2	7.4	6.4
30 DAY AVE	8.3	8.3	7.5	7.3	7.0	6.9	6.6
10 PCT POINT	129.0	126.0	129.0	122.0	129.0	127.0	132.0
MAX DES.F BLEND	345.0	362.0	369.0	363.0	359.0	361.0	368.0
30 DAY AVE	355.3	356.6	359.8	360.3	360.0	360.1	364.5
W.U.F. BLEND	123.8	127.7	134.5	139.8	137.1	137.8	129.3
30 DAY AVE	127.2	127.3	129.2	130.9	131.6	133.3	134.2
EVAP. AT 300 F	90.5	88.3	86.9	86.2	87.5	87.9	85.0
RECOVERY PCT	96.0	96.0	96.8	97.0	97.0	97.0	97.0
RESIDUE PCT	1.1	1.2	1.1	1.3	1.2	1.0	1.2
RSH PPM	0.600	0.700	2.000	2.000	1.200	1.100	1.400
30 DAY AVE	1.166	1.076	1.318	1.431	1.318	1.353	1.498
COKR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 DAY AVE	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KRR BLEND	96.19	95.50	95.04	94.91	94.90	94.99	94.92
KRM BLEND	85.36	85.21	85.18	85.13	85.50	85.31	85.47
KRR+KRM/2	90.77	90.35	90.11	90.02	90.20	90.15	90.19
30 DAY AVE	90.50	90.47	90.38	90.32	90.30	90.26	90.11
RAD OCT. BLEND	91.70	91.56	91.54	91.50	91.78	91.63	91.75
30 DAY AVE	91.65	91.63	91.60	91.59	91.62	91.61	91.62
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.40	0.20	0.40	0.20	0.00	0.00
SULFUR	0.009	0.002	0.000	0.000	0.000	0.000	0.000

EXCHANGE REGULAR SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	120	128	131	143	151	157	163
[illegible] NUMBER	1003	1006	1003	1006	1003	1006	1003
DATE COMPLETED	6 -6-74	6-16-74	6-23-74	7 -3-74	7-10-74	7-19-74	7-24-74
BARRELS BLENDED	49819.	40253.	53379.	48993.	49050.	48808.	49475.
GRADE OF BLEND							
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
L.S.T.P.	47.3	63.4	70.0	52.3	58.5	58.8	57.7
LT. WAXY GASO.	46.4	33.5	26.4	45.7	39.0	39.0	40.1
C5-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LUN	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BUTANE	1.5	3.1	3.6	2.0	2.5	2.2	2.2
LUK	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALKYLATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFORMATE	4.7	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	99.9	100.0	100.0	100.0	100.0	100.0	100.0
BLEND QUALITY							
[illegible]VITY API	60.1	58.3	57.4	60.4	58.9	59.3	59.3
R[illegible].P.	7.5	8.9	8.6	8.6	8.9	8.8	8.8
V/L RATIO	19.2	17.6	12.6	17.0	16.4	19.4	18.6
30 DAY AVE	10.8	12.1	12.7	16.4	15.7	16.2	17.8
10 PCT POINT	129.0	133.0	133.0	132.0	128.0	127.0	128.0
MAX DEG.F BLEND	391.0	392.0	394.0	383.0	390.0	406.0	399.0
30 DAY AVE	388.8	387.9	389.1	390.0	389.7	393.2	394.4
W.U.F. BLEND	166.9	148.6	140.4	158.1	152.2	161.6	160.2
30 DAY AVE	165.4	164.9	159.1	153.4	149.6	152.7	158.0
EVAP. AT 300 F	85.8	83.0	82.9	84.8	83.9	83.2	84.0
RECOVERY PCT	97.0	96.8	96.3	96.2	96.3	97.0	96.7
RESIDUE PCT	1.3	1.3	1.2	1.5	1.5	1.3	1.2
RSH PPM	0.400	0.600	0.900	1.600	1.500	1.400	1.300
30 DAY AVE	0.828	0.799	0.789	0.886	1.169	1.340	1.449
CORR.3HR AT 122F	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LEAD GR/GAL	2.57	2.31	1.88	2.50	2.09	2.21	2.32
KRR BLEND	93.02	93.01	93.01	93.03	92.97	93.00	93.01
30 DAY AVE	93.01	93.01	93.01	93.01	93.00	93.00	93.00
KRM BLEND	88.65	87.97	87.23	88.69	87.83	87.57	87.60
KRR + KRM	181.67	180.98	180.24	181.72	180.80	180.57	180.61
30 DAY AVE	181.84	181.67	181.30	181.14	180.91	180.81	180.92
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS,EX.MG/100ML	0.20	0.20	0.40	0.40	0.40	0.40	0.20
SULFUR	0.004	0.003	0.001	0.002	0.003	0.003	0.003

REGULAR 76 GASOLINE UM — SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	105	111	113	119	121	123	124
ANK NUMBER	1001	288	287	1001	288	287	288
DATE COMPLETED	5-21-77	5-26-77	5-30-77	6-2-77	6-4-77	6-7-77	6-10-77
BARRELS BLENDED	79345.	79197.	59542.	39576.	44527.	70717.	69361.
GRADE OF BLEND	W	W	W	W	W	W	W
V/L TEMPERATURE	140.	140.	140.	140.	140.	140.	140.
COMPOSITION (VOL. PCT.)							
BUTANE	1.4	2.0	1.9	2.6	3.3	2.8	2.6
C3-C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LT. WAXY GASO.	0.0	0.0	0.0	0.1	0.0	0.0	0.0
LUK	34.8	37.4	38.4	36.0	38.1	36.5	32.0
REFORMATE (101)	57.4	54.5	55.1	55.4	57.3	55.6	53.8
PLAT (97)	6.5	6.1	4.6	6.0	1.3	5.1	11.6
TOTAL	100.1	100.0	100.0	100.1	100.0	100.0	100.0
BLEND QUALITY							
GRAVITY (API)	52.20	53.00	52.80	52.30	53.30	52.50	51.80
10 PCT POINT	125.00	121.00	125.00	125.00	119.00	128.00	127.00
50 PCT POINT	233.00	227.00	229.00	232.00	223.00	231.00	238.00
90 PCT POINT	339.00	336.00	333.00	335.00	332.00	336.00	339.00
R.V.P.	8.40	8.90	8.50	8.80	8.60	7.40	9.00
30 DAY AVE	8.68	8.70	8.72	8.76	8.75	8.55	8.57
V/L RATIO	14.40	17.70	15.80	13.20	15.60	16.80	14.80
30 DAY AVE	10.18	11.95	12.91	13.41	13.57	14.21	14.28
MAX DEG.F BLEND	415.00	411.00	406.00	408.00	405.00	406.00	413.00
30 DAY AVE	413.83	414.59	414.27	414.38	413.67	412.42	411.93
M.O.N. BLEND	407.90	399.05	401.80	415.00	392.75	406.20	413.80
30 DAY AVE	392.49	389.56	389.04	392.19	392.23	395.92	400.04
RECOVERY PCT	97.00	96.50	97.00	97.00	97.00	96.00	96.00
RESIDUE PCT	1.10	1.30	1.20	1.30	1.30	1.10	1.30
CORR.3HR AT 122F	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MN (GR/GAL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 DAY AVE	0.02	0.02	0.02	0.02	0.02	0.01	0.00
KRR BLEND	95.32	95.28	95.22	95.20	95.50	95.14	95.26
KRM BLEND	85.50	95.49	85.50	85.49	85.50	85.51	85.51
KRR+KRM/2	90.41	90.38	90.36	90.34	90.50	90.32	90.38
30 DAY AVE	90.29	90.24	90.24	90.25	90.27	90.25	90.26
ROAD OCT. BLEND	90.63	90.63	90.63	90.63	90.50	90.63	90.64
30 DAY AVE	90.62	90.62	90.62	90.62	90.61	90.61	90.62
OXID. STAB. MIN.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GUMS, EX.MG/100ML	0.00	0.20	0.00	0.20	0.20	0.00	0.20
H (PPM)	1.000	1.300	1.000	1.300	1.800	0.400	0.600
30 DAY AVE	1.116	1.146	1.146	1.134	1.184	1.059	0.971
LEAD	0.000	0.000	0.000	0.001	0.001	0.001	0.000

HPFGAREP
1419 04/19/78

EXCHANGE REGULAR SAN FRANCISCO REFINERY PRODUCTS REPORT

BLEND NUMBER	47	59A	71	74	85	93	105
TANK NUMBER	60	61	60	60	61	61	1004
DATE COMPLETED	2-14-78	3-3-78	3-13-78	3-19-78	3-28-78	4-6-78	4-15-78
BARRELS BLENDED	40307.	38679.	29591.	25518.	28838.	33892.	52725.
GRADE OF BLEND							
V/L TEMPERATURE	116.	116.	124.	124.	124.	124.	124.
COMPOSITION (VOL. PCT.)							
BUTANE	5.9	6.7	.0	.2	2.0	.0	3.5
C5-C6	46.4	4.1	52.2	22.9	.0	19.8	21.7
LT. MAXY GASO.	.0	21.8	.0	.0	26.9	33.4	.0
LUK	.0	.0	.0	.0	.0	.0	.0
REFORMATE	.0	.0	.0	.0	.0	.0	.0
PLAT	47.7	67.3	47.8	76.9	71.3	46.8	74.8
LAR REFORMATE	.0	.0	.0	.0	.0	.0	.0
TOTAL	100.0	99.9	100.0	100.0	100.1	100.0	100.0
BLEND QUALITY							
GRAVITY (API)	60.60	55.90	60.20	59.60	54.40	57.60	56.40
10 PCT POINT	113.00	113.00	126.00	115.00	134.00	120.00	131.00
50 PCT POINT	201.00	226.00	207.00	206.00	238.00	210.00	228.00
90 PCT POINT	325.00	339.00	325.00	326.00	338.00	323.00	338.00
MAX DEG.F BLEND	392.00	417.00	401.00	394.00	418.00	394.00	419.00
30 DAY AVE	400.95	401.98	403.36	405.69	408.59	401.63	408.26
R.V.P.	11.60	11.40	9.80	8.30	8.40	7.50	8.90
30 DAY AVE	11.49	11.69	11.04	10.05	9.66	8.47	8.35
V/L RATIO	12.00	9.60	5.40	2.80	2.20	1.10	2.80
30 DAY AVE	9.94	11.53	9.35	6.42	5.43	2.82	2.27
RECOVERY PCT	95.00	95.00	96.00	97.00	96.00	96.50	97.00
LEAD (GR/GAL)	1.45	1.18	2.08	1.87	1.26	1.85	1.34
30 DAY AVE	1.17	1.22	1.53	1.65	1.56	1.77	1.54
KRR BLEND	93.02	93.01	93.01	93.00	93.00	93.00	93.00
30 DAY AVE	93.01	93.01	93.01	93.01	93.01	93.00	93.00
KRM BLEND	88.14	87.18	87.19	87.48	86.80	87.58	87.17
KRR + KRM	181.16	180.19	180.20	180.48	179.80	180.58	180.17
30 DAY AVE	180.44	180.49	180.55	180.27	180.16	180.27	180.25
RESIDUE PCT	1.20	1.20	1.20	1.10	1.20	1.10	1.10
CORR.3HR AT 122F	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GUMS,EX.MG/100ML	.20	.20	.20	.20	.20	.20	.20
RSH (PPM)	.400	.600	.400	.500	.300	.300	.400
30 DAY AVE	.416	.471	.471	.510	.460	.368	.374
SULFUR	.000	.000	.000	.000	.000	.000	.000

460 80-87 AVIATION GASOLINE

BLEND NUMBER		039	120	175	222	279	357	393	425
TANK NUMBER	SPEC SHEET	B 62	62	62	B 348	B 348	62	662	B348
SAMPLE NUMBER	MIL-G-5572F	500	1578	2241	2643	3361	4278	4729	5111
DATE BLEND COMPLETED	DATED	02/05/82	04-21-82	06/03/82	0704	08/14/82	10-17-82	11/20/82	12/18/82
BARRELS BLENDED	8-1-79	10,0	8,9	14,9	12,4	9,9	17,2	10,0	10,0
UNIFINED C5/C6		28,8	25,8	29,1	25,8	27,3	28,3	29,1	25,6
U33 AVIA BASE STOCK		30,4		32,4	32,3	29,3	29,8	31,4	27,8
U110 LITE ALKY		40,8	56,2	38,5	41,9	43,4	41,9	39,5	46,6
U100 REFORMATE			18,0						
GRAVITY API 60 F.		66,5	65,8	67,0	67,2	67,2	66,8	67,0	67,4
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
COMBUSTION 2 HOURS 212 F.	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0	6,6	6,7	6,2	6,7	6,3	6,6	6,7	6,8
GUMS AIR JET MG/100 ML	3.0 MAX	0,2	0,2	0,2	0,4	0,2	0,4	0,4	1,0
GUMS POT AIR JET MG/100 ML	6.0 MAX	2,3	1,4	1,4	2,2	2,9	0,8	0,4	5,7
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0,1	1,0	0,8	0,1	0,1	0,1	0,1	0,1
ANILINE POINT ASTM DEG F		136,5	132,0	137,0	138,0	139,3	138,0	138,5	140,5
ANILINE GRAVITY CONSTANT	7500 MIN 1*	9077	8686	9179	9274	9361	9218	9280	9470
WATER REACT INTERFACE RTG	2 MAX	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
WATER REACT SEPARATION RTG	2 MAX	1B	1B	1B	1B	1	1	1B	1B
FREEZING POINT DEGREES F	-76 MAX	<-112	<-118	<-112	<-112	<-112	<-112	<-112	<-112
SULFUR WEIGHT PCT	0.05 MAX	0,01	0,01	0,01	0,02	0,02	0,02	0,01	0,01
TEL ML/GAL CALC	0.50 MAX	0,42	0,36	0,41	0,40	,41	0,40	0,42	0,39
KR LEAN D-2700	80.0 MIN	83,6	87,2	82,6	81,7	82,0	83,9	83,0	83,6
KR RICH	87.0 MIN	90,0	92,6	88,6	88,1	88,3	90,2	88,6	89,6
EP DEGREES F	338 MAX	320	334	329	328	316	330	316	332
RESIDUE VOL PCT	1.5 MAX	1,0	1,0	1,5	1,0	1,5	1,0	1,5	1,0
LOSS PCT	1.5 MAX	1,0	1,0	1,5	1,0	1,5	1,0	1,5	1,0
10% EVAP DEGREES F	167 MAX	149	150	150	148	152	150	144	147
40% EVAP DEGREES F	167 MIN	191	196	192	190	192	193	187	191
50% EVAP DEGREES F	221 MAX	202	207	203	202	204	203	199	202
90% EVAP DEGREES F	275 MAX	268	275	272	272	267	271	263	272
SUM OF 10% & 50% EVAP	307 MIN	351	357	353	350	356	353	343	349

ATTACHMENT M-1

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER

DISTRIBUTION = GEN.SUPT.OPER, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

ok

460

80-87 AVIATION GASOLINE

BLEND NUMBER		9	36	64	80	104	131	157	174	228
TANK NUMBER	SPEC SHEET	348	348	348	348	348	348	348	348	348
SAMPLE NUMBER	MIL-G-5572E	77	420	726	911	1232	1527	1831	2050	2681
DATE BLEND COMPLETED	DATED	1-6-78	1-27-78	2-17-78	3-3-78	03-24-78	04-14-78	05-06-78	05-20-78	7/1/78
BARRELS BLENDED	07/01/72	6.0	6.5	9.0	12.3	7.4	7.9	10.4	11.9	11.0
UNIFINED C5/C6		30.0	27.7	30.7	30.3	14.1	28.2	28.2	32.0	31.8
U110 LITE ALKY		53.3	63.1	52.9	50.8	67.0	53.8	53.4	50.0	49.1
U100 REFORMATE		16.7	9.2	16.4	18.9	18.9	18.0	18.4	18.0	19.1
GRAVITY API 60 F.		66.6	65.5	65.6	65.2	65.2	65.0	65.0	65.4	64.3
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0	6.4	6.5	6.8	6.3	6.2	6.5	6.5	6.7	6.9
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.4	0.4	0.2	0.4	0.1	0.2	0.8	0.2
GUMS POT 41R JET MG/100 ML	6.0 MAX	1.9	2.5	1.1	1.5	0.8	1.0	0.7	2.7	1.0
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.1	0.1	0.1	0.6	0.1	0.1	0.4	0.3	0.1
ANILINE POINT ASTM DEG F		124.2	127.5	126.5	126.2	127.5	125.7	126.0	125.0	120.5
ANILINE GRAVITY CONSTANT	7500 MIN 1*	8023	8351	8298	8228	8313	8171	8190	8175	7748
WATER REACT VOL CHANGE ML	2 MAX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATER REACTION	2 MAX	1	1	1	1	1	1	1	1	1
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112
SULFUR WEIGHT PCT	0.05 MAX	0.01	0.01	0.01	0.01	0.01	0.01	0.001	0.01	0.01
TEL ML/GAL CALC	0.50 MAX	0.16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KR LEAN D=2700	80.0 MIN	86.2	86.2	86.0	85.7	87.0	87.0	86.2	85.6	84.7
KR RICH	87.0 MIN	94.2	89.5	88.3	87.8	94.1	94.6	93.7	92.6	91.9
MAX DEGREES F	338 MAX	334	329	335	331	333	330	323	334	337
RESIDUE PCT	1.5 MAX	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
LOSS PCT	1.5 MAX	1.0	1.5	1.0	1.0	0.0	1.0	1.0	1.5	0.0
10% EVAP DEGREES F	167 MAX	147	146	147	149	159	149	153	150	155
40% EVAP DEGREES F	167 MIN	189	190	188	192	200	194	197	193	190
50% EVAP DEGREES F	221 MAX	200	201	199	203	210	204	206	203	201
90% EVAP DEGREES F	275 MAX	270	265	264	267	267	264	267	265	263
SUM OF 10% & 50% EVAP	307 MIN	347	347	346	352	359	353	359	353	356

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OF GREATER

DISTRIBUTION - GEN.SUPT.OPER, SUPV.PROC.ENGRG, BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

M-2

460 80/87 AVIATION GASOLINE

TANK NUMBER	SPEC SHEET	348	348	348	348	348	348	348	B348	348
SAMPLE NUMBER	MIL-G-5572E	260	1631	2385	4226	4671		7578	7785	8064
DATE BLEND COMPLETED	GS-71 DATED	01-11-75	03-08-75	04-11-75	05-23-75	6-13-75	07-12-75	08-15-75	08-29-75	09-12-75
BARRELS BLENDED	07/01/72	15.9	13.0	14.4	14.9	14.9	14.7	14.8	11.8	14.9
U80 UNIFINED C5/C6			23.0							
U33 AVIA BASE STOCK		59.7	34.9	57.2	51.3	46.6	47.3	36.4	41.8	42.6
U-110 LITE ALKY		37.3	42.1	39.9	25.7	23.7	24.9	28.7	29.1	29.7
BLENDING BUTANE		3.0		2.9						
U120 LT UNICRACKATE					23.0	29.7	27.8	22.4	29.1	27.7
U100 REFORMATE								12.5		
INHIBITOR OXID LB/1000 BBL6.4 MAX		5.1	5.0	4.9	5.0	5.01	5.1	5.1	5.08	5.0
GRAVITY API 60F		67.8	69.4	68.1	68.1	67.3	66.7	64.1	66.0	67.6
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	MERC	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212F	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID LBS	5.5-7.0	6.2	6.5	6.8	7.0	6.6	6.3	5.9	6.5	6.8
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.6	1.6	0.2	0.6	0.2	0.4	0.4	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	3.0	0.6	2.4	1.2	2.8	2.5	1.6	2.5	2.2
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.1	0.1	0.4	0.6	0.2	0.2	0.0	0.3	0.0
ANILINE POINT ASTM DEG F		140.5	143.0	142.5	137.0	137.3	137.5	126.4	134.5	139.5
ANILINE GRAVITY CONSTANT	7500 MIN 1*	9526	9924	9704	9330	9240	9171	8102	8677	9427
WATER REACT VOL CHANGE ML	2 MAX	0.0	0.5	0.0	0.0	0.0	0.0	1	0.0	0.0
WATER REACTION	2 MAX	1	1	1	1	1	1	1B	1	1
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112
SULFUR WEIGHT PCT	0.05 MAX	0.01	0.01	0.005	0.01-	0.01	0.01-	0.01-	0.01	0.01
TEL ML/GAL CALC	0.50 MAX		0.42	0.38	0.38	0.38	0.42	0.41	0.38	0.38
KR LEAN D-2700	80.0 MIN	82.6	81.4	83.0	81.9	81.6	80.9	82.5	82.3	81.0
KR RICH	87.0 MIN	88.1	87.0	89.0	87.5	87.1	87.3	88.2	88.0	89.6
FAX DEGREES F	338 MAX	295	299	297	284	302	295	310	300	291
RESIDUE PCT	1.5 MAX	1.0	1.0	1.0	1.0	1.0	.5	1.0	1.5	1.0
LOSS PCT	1.5 MAX	1.0	1.5	1.0	1.0	1.5	1.0	1.0	1.5	0.5
10PCT EVAPORATED DEG F	167 MAX	160	153	159	151	150	152	159	148	148
40PCT EVAPORATED DEG F	167 MIN	187	182	192	181	183	187	195	185	184
50PCT EVAP DEGREES F	221 MAX	192	190	199	189	191	196	204	196	194
90 EVAPORATED F	275 MAX	230	231	238	230	238	243	259	245	239
SUM OF 10PCT & 50PCT EVAP	307 MIN	352	345	358	340	341	348	363	344	342

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500
1* OR GREATER

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER DOD GAR LABORATORY 2

460 80/87 AVIATION GASOLINE

TANK NUMBER	SPEC SHEET	348	B-348	348	348	348	34A	346	348	346
SAMPLE NUMBER	MIL-G-5572E		5484	6618	7011	7289	0572	8830	9356	10230
DATE BLEND COMPLETED	GS-71 DATED	07-13-74	07-27-74	08-09-74	08-30-74	09-13-74	09-27-74	10-11-74	11-09-74	11-29-74
BARRELS BLENDED	07/01/72	14.7	9.8	14.7	15.4	13.8	9.8	9.9	13.2	12.9
U33 AVIA BASE STOCK		57.6	58.3	56.9	56.2	56.1	56.0	57.7	56.9	62.7
U80 REFORMATE										0.5
U-110 LITE ALKY		38.5	37.7	39.0	39.9	40.0	40.0	38.4	37.1	33.9
BLENDING BUTANE		4.1	4.0	4.1	3.9	3.9	4.0	3.9	4.0	2.9
INHIBITOR UX10 LB/1000 BBL	8.4 MAX		.005		5.20	.005	5.09	5.0	.005	.005
GRAVITY API 60F		67.0	67.0	→66.7	67.4	68.3	68.4	68.1	68.1	67.6
COLOR SAYBOLT	RED	RED	RED	RED	RED	RED	RED	RED	RED	RED
DOCTOR TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212F	1 MAX	1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID LBS	5.5-7.0	6.5	6.5	6.4	6.2	6.5	6.4	6.5	6.8	6.4
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.6	0.2	0.8	0.2	0.2	0.2	0.6	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	2.6	3.2	3.5	1.7	0.5	1.5	2.5	1.9	0.7
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.4	0.2	0.1	0.5	0.2	0.1	0.7	0.6	0.1
ANILINE POINT ASTM DEG F		141.4	142.0	138.5	140.3	142.3	141.5	142.0	141.5	138.4
ANILINE GRAVITY CONSTANT	7500 MIN 1*	9474	9514	9238	9456	9719	9679	9670	9636	9356
WATER REACT VOL CHANGE ML	2 MAX	0.0	1	0.0	0.0	0.0	0.0	0.0	0.5	0.5
WATER REACTION	2 MAX	1	1B	1	1	1B	1	1	1B	1B
FREEZING POINT DEGREES F	-76 MAX	B-112	B-112	B-112	B-112	B-112	B-112	B-112	B-112	-112
SULFUR WEIGHT PCT	0.05 MAX	0.02	0.02	0.01-	0.01	0.01	0.01-	0.01	0.01-	0.01
TEL ML/GAL CALC	0.50 MAX	0.41	0.42	0.40	0.40	0.42	0.37	0.41		
KR LEAN U-2700	80.0 MIN	81.3	82.3	82.1	80.7	81.4	81.4	82.7	82.9	83.0
KR RICH	87.0 MIN	87.1	87.5	87.7	86.5	87.5	87.5	87.5	88.2	88.3
MAX DEGREES F	338 MAX	292	292	296	295	294	287	294	296	290
RESIDUE PCT	1.5 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.0
LOSS PCT	1.5 MAX	1.5	1.0	0.6	0.8	1.0	1.5	1.5	1.0	1.0
10PCT EVAPORATED DEG F	167 MAX	156	155	161	158	158	161	158	158	159
40PCT EVAPORATED DEG F	167 MIN	192	192	196	190	191	189	190	189	188
50PCT EVAP DEGREES F	221 MAX	197	199	202	197	197	195	196	195	193
90PCT EVAP DEGREES F	275 MAX	234	233	237	236	230	231	234	231	229
SUM OF 10PCT & 50PCT EVAP	307 MIN	353	354	363	355	355	356	354	353	352

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500
1* OR GREATER

DISTRIBUTION- GEN SUPT OPER SUPV PROC ENGRG ACCOUNTING SUPT BULK OPER DOD GAR LABORATORY 2

461 100-130 AVIATION GASOLINE

BLEND NUMBER			356	381	392	408	424
TANK NUMBER	SPEC SHEET		8349	8349	8349	8349	862
SAMPLE NUMBER	G-1		4276	4571	4728	4919	5107
DATE BLEND COMPLETED	DATED 8-1-79		10-16-82	11/08/82	11/20/82	12/03/82	12/17/82
BARRELS BLENDED	MIL-G-5572E		14,7	14,5	9,9	14,9	13,9
UNFINED C5/C6			12,0	12,2	12,8	12,1	12,1
HIGH LITE ALKY			78,9	75,8	73,3	75,6	74,8
BLENDING BUTANE			1,3	1,5	1,6	1,1	1,5
HIGH REFORMATE			7,8	10,5	12,3	11,2	11,6
GRAVITY API 60 F.			69,0	68,0	67,3	67,7	67,5
COLOR SAYBOLT	GREEN		GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST			NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX		1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE		NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5,5-7,0		6,6	6,4	6,8	6,7	6,9
GUMS AIR JET MG/100 ML	3,0 MAX		0,4	0,4	0,4	0,4	0,4
GUMS POT AIR JET MG/100 ML	6,0 MAX		0,7	3,0	1,2	1,6	2,6
GUMS POT PRECIPT MG/100 ML	2,0 MAX	1*	0,2	0,4	0,1	0,3	1,8
ANILINE POINT ASTM D66 F			149,8	144,5	140	141,5	142,0
ANILINE GRAVITY CONSTANT	7500 MIN		10336	9826	9422	9580	9585
WATER REACT INTERFACE RTG	2 MAX		0,0	0,0	0,0	0,0	0,0
WATER REACT SEPARATION RTG	2 MAX		1	1B	1B	1B	1B
FREEZING POINT DEGREES F	-76 MAX		<-112	<-112	<-112	<-112	<-112
AROMATICS FIA VOLUME PCT	5,0 MIN	2*	4,8	5,6	7,8	7,4	7,3
SULFUR WEIGHT PCT	0,05 MAX		0,01	0,01	<0,01	0,01	0,01
TEL ML/GAL CALC	4,60 MAX	3*	3,86	3,82	3,79	3,80	3,81
KR LEAN D-2700	100,0 MIN		113,9	113,1	110,1	110,5	110,6
KR RICH	130,0 MIN		137,7	134,1	133,8	133,5	130,5
EP DEGREES F	336 MAX		312	322	325	330	336
RESIDUE VOL PCT	1,5 MAX		1,5	1,0	1,0	1,0	1,0
LOSS PCT	1,5 MAX		1,5	1,0	1,0	1,0	1,0
10% EVAP DEGREES F	167 MAX		145	152	152	150	152
40% EVAP DEGREES F	167 MIN		197	201	199	199	201
50% EVAP DEGREES F	221 MAX		206	209	209	206	210
90% EVAP DEGREES F	275 MAX		247	252	259	258	265
SUM OF 10% & 50% EVAP	307 MIN		351	404	361	356	362

ATTACHMENT N-1

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

DISTRIBUTION - GEN.SUPT.OPER, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

461 100-130 AVIATION GASOLINE

BLEND NUMBER			204	215	230	241	259	269	278	288	314
TANK NUMBER	SPEC SHEET		B 349	B 62	B 62	B 349	62	349	B 62	B 349	62
SAMPLE NUMBER	G-1		2540	2659	2798	2896	3126	3241	3359	3463	3793
DATE BLEND COMPLETED	DATED 8-1-79		06/23/82	07/01-82	07/09/82	07/17/82	07/30/82	08/07/82	08/13/82	08/20/82	09-10-82
BARRELS BLENDED	MIL-G-5572E		13.9	14.9	16.8	16.1	9.3	13.9	14.7	15.7	14.8
UNIFINED C5/C6			20.3	19.5	19.8	18.8	27.2	17.4	10.4	10.3	10.3
U110 LITE ALKY			71.7	73.8	73.0	73.7	59.8	73.9	79.5	80.1	81.2
BLENDING BUTANE									1.4	1.3	1.6
U100 REFORMATE			8.0	6.7	7.2	7.5	13.0	8.7	8.7	8.3	6.9
GRAVITY API 60 F.			68.6	68.1	69.1	67.3	67.7	66.5	67.6	67.8	69.1
COLOR SAYBOLT	GREEN		GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST			NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX		1A	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE		NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0		6.8	6.7	6.7	6.6	6.9	6.2	6.5	6.4	6.6
GUMS AIR JET MG/100 ML	3.0 MAX		0.4	0.2	0.4	0.4	0.4	0.2	0.4	0.4	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX		1.5	1.8	2.3	2.4	2.5	2.8	4.0	2.0	1.3
GUMS POT PRECIPT MG/100 ML	2.0 MAX	1*	1.2	0.8	0.1	0.9	0.1	0.4	0.4	1.1	0.3
ANILINE POINT ASTM DEG F			144.5	142.5	146.0	141.5	137.0	139.3	143.6	146.5	149.0
ANILINE GRAVITY CONSTANT	7500 MIN		9913	9706	10009	9525	9275	9263	9707	9933	10296
WATER REACT INTERFACE RTG	2 MAX		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATER REACT SEPARATION RTG	2 MAX		1B	1B	1B	1B	1B	1	1	1	1
FREEZING POINT DEGREES F	-76 MAX		<=112	<=112	<=112	<=112	<=112	<=112	<=112	<=112	<112
AROMATICS FIA VOLUME PCT	5.0 MIN	2*	6.0	8.3	6.3	7.9	10.9	10.3	9.3	6.9	48
SULFUR WEIGHT PCT	0.05 MAX		0.01	0.01	0.01	0.01	0.01	0.01	0.01	<0.01	<0.01
TEL ML/GAL CALC	4.60 MAX	3*	3.83	3.62	3.76	3.84	3.86	3.87	3.87	3.86	3.88
KR LEAN D-2700	100.0 MIN		109.9	111.2	113.9	110.71	110.6	110.0	113.9	115.5	113.9
KR RICH	130.0 MIN		131.5	131.1	133.5	131.2	136.2	135.8	136.5	138.4	137.0
EP DEGREES F	338 MAX		329	330	324	320	323	328	328	321	324
RESIDUE VOL PCT	1.5 MAX		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0
LOSS PCT	1.5 MAX		1.0	0.5	1.0	0.0	1.0	0.5	1.5	1.5	1.0
10% EVAP DEGREES F	167 MAX		150	151	150	144	148	157	160	155	153
40% EVAP DEGREES F	167 MIN		197	196	196	194	191	202	205	204	199
50% EVAP DEGREES F	221 MAX		205	205	205	204	203	210	212	210	207
90% EVAP DEGREES F	275 MAX		253	254	253	251	257	261	257	254	251
SUM OF 10% & 50% EVAP	307 MIN		355	356	355	348	351	367	372	365	360

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

DISTRIBUTION - GEN.SUPT.OPER, SUPT. B.O., BLEND.FOREMAN, BLEND.ENGR, LABORATORY.2

461 100-130 AVIATION GASOLINE

BLEND NUMBER		9	038	68	90	114	133	154	179	191
TANK NUMBER	SPEC SHEET	B 349	B 349	B 349	349	349	349	B349	349	349
SAMPLE NUMBER	G-1	97	499	898	1180	1511	1786	1989	2273	2393
DATE BLEND COMPLETED	DATED 8-1-79	01/08/82	02/05/82	03/05/82	03/26/82	04-16-82	05-03-82	05/19/82	06/06/82	06/14/82
BARRELS BLENDED	MIL-G-5572E	14.0	12.5	12.4	13.4	13.9	14.4	15.9	14.9	14.8
UNFINED C5/C6		19.4	20.6	19.5	18.0	21.0	21.0	20.3	20.9	19.0
U110 LITE ALKY		65.5	64.1	69.1	76.0	68.9	66.5	71.7	70.5	73.5
U100 REFORMATE		15.1	15.3	11.4	6.0	10.1	10.5	8.0	8.8	7.5
GRAVITY API 60 F.		65.6	65.7	64.6	66.3	67.4	67.2	67.4	68.3	68.8
COLOR SAYBOLT	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
DUCTION TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX	1A	1A	1A	1A	1A	1A	1B	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0	5.9	6.7	6.2	6.4	6.5	6.4	6.3	6.3	6.7
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.4
GUMS POT AIR JET MG/100 ML	6.0 MAX	1.2	2.3	1.9	1.9	2.6	1.3	1.9	2.0	2.5
GUMS POT PRECIPT MG/100 ML	2.0 MAX 1*	0.8	0.1	0.2	0.3	0.1	0.6	0.5	0.3	0.5
ANILINE POINT ASTM DEG F		134.5	134.0	131.2	137.5	139.5	140.3	142.0	144.0	145.0
ANILINE GRAVITY CONSTANT	7500 MIN	8823	8804	8476	9116	9402	9428	9571	9835	9976
WATER REACT INTERFACE RTG	2 MAX	0.0	0.0	0.0	0.0	0.0	0.0	0.05	0.0	0.0
WATER REACT SEPARATION RTG	2 MAX	1B	1B	1B	1B	1B	1A	1B	1	1B
FREEZING POINT DEGREES F	-76 MAX	B-112	<-112	<-112	<-112	<-112	<-112	<-112	B-112	<-112
AROMATICS FIA VOLUME PCT	5.0 MIN 2*	9.6	10.2	12.0	8.7	7.9	8.3	7.1	6.7	6.2
SULFUR WEIGHT PCT	0.05 MAX	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
TEL ML/GAL CALC	4.60 MAX 3*	3.90	3.84	3.82	3.42	3.83	3.80	3.79	3.51	3.84
KN LEAN D-2700	100.0 MIN	110.7	107.7	106.8	109.9	110.7	112.3	109.6	110.2	112.3
KN RICH	130.0 MIN	137.1	133.5	132.8	133.9	137.2	132.5	130.0	131.6	131.8
EP DEGREES F	338 MAX	338	338	336	336	336	338	327	330	326
RESIDUE VOL PCT	1.5 MAX	1.0	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0
LOSS PCT	1.5 MAX	1.0	0.5	0.5	1.5	1.5	1.0	1.0	1.5	1.5
10% EVAP DEGREES F	167 MAX	161	155	156	152	153	153	145	153	152
40% EVAP DEGREES F	167 MIN	205	202	200	202	202	199	194	197	199
50% EVAP DEGREES F	221 MAX	213	211	210	212	211	208	201	207	208
90% EVAP DEGREES F	275 MAX	269	271	274	271	272	267	252	260	255
SUM OF 10% & 50% EVAP	307 MIN	374	366	366	364	364	363	346	360	360

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OR GREATER
2* WAIVED BY G-1 SPEC
3* 4.0 MAX BY G-1 SPEC

E-N

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LOS ANGELES REFINERY PRODUCTS REPORT PAGE 1

461 100-130 AVIATION GASOLINE

BLEND NUMBER		007	045	077	118	147	175	202	220	247
TANK NUMBER	SPEC SHEET	349	349	349	349	349	349	349	349	349
SAMPLE NUMBER	G-1	109	548	1055	1657	1995	2310	2630	2855	3143
DATE BLEND COMPLETED	DATED 1-15-76	01-06-79	02-03-79	03-03-79	04-06-79	04-28-79	05-18-79	06-08-79	06-25-79	07-13-79
BARRELS BLENDED	MIL-G-5572E	14.7	12.0	16.0	15.8	14.9	15.8	16	15.5	10.8
TTL BBLS IN TANK AFT BLEND	GS-71							15.7		
UNLEINED GS/C6		25.3	28.6	23.9	14.0	24.3	25.0	23.8	22.2	10.3
U110 LITE ALKY		54.8	54.6	56.0	68.1	56.8	57.7	57.1	68.9	79.8
BLENDING BUTANE					1.3			1.1		
U100 REFORMATE		19.9	16.8	20.1	16.6	18.9	17.3	18.0	15.9	9.9
GRAVITY API 60 F.		63.7	63.9	63.5	65.3	64.5	65.1	64.9	6.5	66.8
COLOR SAYBOLT	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN
DOCTOR TEST		NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
CORROSION 2 HOURS 212 F.	1 MAX	1B	1A	1A	1A	1A	1A	1A	1A	1A
WATER AND SUSPENDED MATTER	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
VAPOR PRESS REID	5.5-7.0	6.2	6.3	6.5	6.6	6.3	6.2	6.8	6.5	6.2
GUMS AIR JET MG/100 ML	3.0 MAX	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
GUMS POT AIR JET MG/100 ML	6.0 MAX	1.9	1.4	1.8	0.4	1.0	1.2	0.5	3.1	1.6
GUMS POT PRECIPT MG/100 ML	2.0 MAX	0.4	0.6	0.3	1.2	0.6	0.5	0.2	0.1	0.2
ANILINE POINT ASTM DEG F		121.2	123.5	122.5	131.2	136.5	128.5	129.0	133.0	139.7
ANILINE GRAVITY CONSTANT	7500 MIN 1*	7720	7892	7779	8567	8804	8365	8372	8712	9332
WATER REACT VOL CHANGE ML	2 MAX	0.0	0.0	0.0	1B	0.0	0	0.0	0.0	0.0
WATER REACTION	2 MAX	1	1	1B	0.5	1	1	1	1	1
FREEZING POINT DEGREES F	-76 MAX	8-112	8-112	8-112	<-112	8-112	8-112	-112	<-112	8-112
AROMATICS FIA VOLUME PCT	5.0 MIN 2*	15.6	13.3	14.1	11.1	11.4	12.5	11.4	10.2	8.0
SULFUR WEIGHT PCT	0.05 MAX	<0.01	0.01	0.01	0.00	<0.01	<0.01	0.01	0.01	<0.01
TEL ML/GAL CALC	4.60 MAX 3*	3.61	3.55	3.61	3.56	3.65	3.40	3.60	3.72	3.93
KR LEAN D-2700	100.0 MIN	104.5	104.5	103.5	107.2	105.3	104.5	104.0	105.1	109.6
KR RICH	130.0 MIN	132.2	130.2	131.2	131.8	131.0	130.4	130.8	130.4	133.5
MAX DEGREES F	338 MAX	334	336	336	338	334	336	332	326	338
RESIDUE PCT	1.5 MAX	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.0	1.5
LOSS PCT	1.5 MAX	0.5	0.0	0.5	1.0	0	1.5	1.5	1.0	1.5
10% EVAP DEGREES F	167 MAX	149	153	151	157	155	152	144	151	150
40% EVAP DEGREES F	167 MIN	192	194	196	201	197	198	195	197	198
50% EVAP DEGREES F	221 MAX	203	206	206	210	208	208	206	207	207
90% EVAP DEGREES F	275 MAX	270	271	270	271	274	273	269	269	267
SUM OF 10% & 50% EVAP	307 MIN	352	359	357	367	363	360	350	358	357

1* HEAT OF COMBUSTION MAY BE WAIVED IF AGC IS 7500 OF GREATER
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GEORGE V. DYROFF
editor

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5

Aviation Fuels

INTRODUCTION

IT IS DIFFICULT TO DISCUSS AVIATION FUELS without reviewing the development history of the various types of aviation fuels and describing quality requirements in terms of official specifications produced by the cooperative efforts of engine manufacturers, airline operators, fuel suppliers, and appropriate government departments. These documents define the required fuel properties and specify the standard test methods to be used. The international validity of these specifications and rigid enforcement ensures that fuels of uniform quality are available on a worldwide basis for all types of aircraft engines.

It is not feasible to include full details of all major international specifications in this chapter. Even summaries of the main requirements would be of little permanent value, since these specifications are revised and updated frequently to meet new aircraft needs or reflect changing supply situations. However, the basic content of the various specifications covering similar grades of fuel do not differ greatly, and, with few exceptions, the same fuel properties are controlled in each. Typical examples of the physical and chemical property requirements contained in current specifications are included for each of the main aviation gasoline and jet fuel grades.

HISTORICAL DEVELOPMENT OF AVIATION FUELS

Aviation gasolines for spark-ignition engines reached their development peak in the 1939 to 1945 war years. The advent of the gas turbine inhibited further piston engine development, and, although large quantities of aviation gasoline will be required for many years, quality requirements are unlikely to change significantly.

The first aviation gas-turbine engines were regarded as having noncritical fuel requirements. Since ordinary illuminating kerosine was the original development fuel, the first turbine fuel specifications were written largely around the properties and test methods associated with this well-established product. With increased complexity in design of the engine and its control, fuel specification tests have become inevitably more complicated and numerous. Current demands for improved performance, economy, and overhaul life will indirectly continue the trend towards additional tests; nevertheless, the optimum compromise between fuel quality and availability is achieved largely by the current fuel specifications.

AVIATION GASOLINE

Composition and Manufacture

Aviation gasoline is the most complex fuel produced in a refinery. Strict process control is required to ensure that the stringent (and sometimes conflicting) specifications are met for volatility, calorific value, and antiknock ratings. In addition, careful handling is required during storage and distribution to guard against various forms of contamination which can affect such properties as volatility, gum values, and the copper strip corrosion test.

Aviation gasoline consists substantially of hydrocarbons. Sulfur-containing and oxygen-containing impurities are limited strictly by specification and only certain additives are permitted (refer to the section on Aviation Fuel Additives).

The main component of high-grade avi-

ation gasolines is isooctane produced in the alkylation process by reaction of refinery butenes with isobutane over acid catalysts. To meet volatility requirements for the final blend, a small proportion of isopentane (obtained by superfractionation of light straight-run gasoline) is added. The aromatic component required to improve rich mixture rating is usually a catalytic reformate. The amount of aromatic components added is limited indirectly by the gravimetric calorific value requirement.

Only grade 80 fuel can include a proportion of straight-run gasoline because straight-run gasolines, which contain varying amounts of paraffins, naphthenes, and aromatics invariably lack the necessary branch-chain paraffins (isoparaffins) required to produce the higher grade fuels.

Specifications

Content

Aviation fuel specifications generally contain three main sections covering suitability, composition, and chemical and physical requirements.

The suitability section is included as a safeguard against the possible failure in service of a fuel which meets all the published physical and chemical tests in the specification. It throws the onus on the fuel producer to obey the spirit as well as the letter of the law. This philosophy is inherent in all aviation fuel specifications.

The composition section stipulates that the fuel must consist entirely of hydrocarbons except for trace amounts of approved additives, such as alkyl lead antiknock additive, dyes, and oxidation inhibitors. Its main importance is in listing the approved additives and, indirectly, in excluding any nonhydrocarbon blending components such as oxygenates, which might be used to improve a critical property of the fuel at the ultimate expense of other fuel properties.

The chemical and physical requirements section is the one most familiar to users since it carefully defines the allowable limits for many chemical and physical properties of the fuel and the standard test methods to be employed.

Fuel Grades

About six basic fuel grades have been in use since the 1939 to 1945 war period. In recent years, the diminishing demand for aviation gasoline has led to a reduction in the number of grades available. With fewer fuel grades, manufacturing, storage, and handling costs were reduced with subsequent benefits to consumers. At present, three grades—80, 100, and 100 lowlead—are specified in ASTM Specification for Aviation Gasolines (D 910).

Specifications covering the various grades have been drawn up by a number of bodies, and these have been revised as engine requirements changed. The most commonly quoted aviation gasoline specifications are those issued by the U.S. Department of Defense (military specifications), the British Ministry of Defense (DERD[1] specifications), and the American Society for Testing and Materials (ASTM D 910). Table 1 lists the main aviation gasoline specifications in current use and indicates the various grades together with their identifying dye colors.

Due to the international nature of aviation activities, the technical requirements of all the Western specifications are virtually identical, and only differences of a minor nature exist between the specifications issued in the various major countries. The Soviet GOST specifications (and their East European equivalents) differ in the grades covered and also in respect to some of the limits applied, but, in general, the same fuel properties are controlled, and most test methods basically are similar to their Western equivalents [American Society for Testing and Materials (ASTM) and Institute of Petroleum (IP) standards]. Soviet aviation gasoline grades are summarized in Table 2.

Table 3 provides detailed requirements for aviation gasoline as contained in ASTM Specification for Aviation Gasolines (D 910). In general, the main technical requirements of all other Western specifica-

[1]In current issues of the British Military Specifications, the traditional term "D.Eng.R.D." has been abbreviated to "DERD" (Directorate of Engine Research and Development). For uniformity, this new abbreviation is used throughout this chapter, even for obsolete specifications.

iation gasolines—main international specification grades.

Identifying Color	Nominal Antiknock Characteristics, Lean/Rich	NATO Code Number	Current Specifications: DERD 2485 British Ministry of Defense	Current Specifications: MIL-G-5572 U.S. Department of Defense[b]	Current Specifications: ASTM D 910	Use
Colorless	73	F-13[a]	...	...	...	blending component
Colorless	80	...	...	...	...	blending, historic
Red	80/87	F-12	80	80/87	80	minor civil
Blue	91/96	F-15[a]	obsolete			
Blue	100/130	F-18	100LL	100/130	100LL	major civil
Green	100/130	...	100	...	100	minor military
Brown	108/135		obsolete			
Purple	115/145	F-22	115	115/145	...	military—virtually obsolete

[a]Obsolete designation.
[b]Specification MIL-G-5572 was withdrawn in 1988.

TABLE 2. Soviet aviation gasoline grades.

Specification	Grade	Color	Use
...	B.70	colorless	obsolete
GOST-1012	B.91/115[a]	green	current
GOST-1012	B.95/130[a]	yellow	current
...	B.100/130	bright orange	obsolete
GOST-5760	BA(115/160)	varies	obsolete

[a]In regular and premium qualities.

tions are virtually identical to those in Table 3, although differences occur in the number of grades covered and, in some cases, the amount of tetraethyl lead (TEL) permitted. The various grades within the specification differ fundamentally in only a few vital respects, such as color, antiknock ratings, and TEL content. This is true of all the Western aviation gasoline specifications. The two remaining grades in the Soviet GOST specification are subdivided, somewhat curiously, into ordinary and premium qualities with differing limits for aromatics, olefins, sulfur, and acidity.

The limits specified for Western grades of aviation gasoline were, in most cases, dictated originally by military aircraft engine requirements. Since then, the performance requirements for civil and military aircraft engines have changed very little. However, improved fuel manufacturing techniques and the reduced demand for certain grades has allowed fuel suppliers to produce modified fuel grades more suited to market requirements. In some cases, the objective has been to offer a technically superior fuel; in other cases, the aim has been the reduction of production, storage, and handling costs by providing a fuel suitable for use in a wider range of engine types than was possible with the standard grades.

Characteristics and Requirements

Antiknock Properties

The various fuel grades are classified by their "antiknock" quality characteristics as determined in single-cylinder laboratory engines. Knock, or detonation, in an engine is a form of abnormal combustion where the air/fuel charge in the cylinder ignites spontaneously in a localized area instead of being consumed progressively by the spark-initiated flame front. Knocking combustion can damage the engine and give serious power loss if allowed to persist. The various grades are designed to guarantee knock-free operation for a range of engines from those used in light aircraft up to high-powered transport and military types.

TABLE 3. Detailed requirements for aviation gasolines.[a]

	Grade 80	Grade 100	Grade 100LL
Knock value, lean rating:			
Minimum octane number	80	100	100
Knock value, rich rating:			
Minimum octane number	87	...	...
Minimum performance number	...	130	130
Color	Red	Green	Blue
Dye content:			
Permissible blue dye, max, mg/U.S. gal	0.5	4.7	5.7
Permissible yellow dye, mg/U.S. gal	None	5.9	None
Permissible red dye, max, mg/U.S. gal	8.65	None	None
Tetraethyl lead, max, mL/U.S. gal	0.5	4.0	2.0
gPb/L	0.14	1.12	0.56
	Requirements for All Grades		
Distillation temperature, °C (°F):			
10% evaporated, max temp		75(167)	
40% evaporated, min temp		75(167)	
50% evaporated, max temp		105(221)	
90% evaporated, max temp		135(275)	
Final boiling point, max, °C (°F)		170(338)	
Sum of 10 and 50% evaporated temperatures, min, °C (°F)		135(307)	
Distillation recovery, min, %		97	
Distillation residue, max, %		1.5	
Distillation loss, max, %		1.5	
Net heat of combustion, min, Btu/lb (MJ/kg)		18720 (43.54)	
Vapor pressure:			
min, kPa(psi)		38(5.5)	
max, kPa(psi)		49(7.0)	
Copper strip corrosion, max		No. 1	
Potential gum (5-h aging gum), max, mg/100 mL		6	
Visible lead precipitate, max, mg/100 mL		3	
Sulfur, max %m		0.05	
Freezing point, max, °C(°F)		−58(−72)	
Water reaction		Volume change not to exceed ±2 mL	
Permissible antioxidants, max, lb/1000 bbl (42 gal)		4.2	

[a]ASTM Specification for Aviation Gasolines (D 910-85).

The antiknock ratings of aviation gasolines are determined in standard ASTM laboratory engines by matching their performance against reference blends of pure *iso*octane (2,2,4-trimethyl pentane) and n-heptane. Fuel rating is expressed as an octane number (ON) which is defined as the percentage of *iso*octane in the matching reference blend. Fuels of higher performance than pure *iso*octane (100 ON) are tested against blends of *iso*octane with various amounts of antiknock additive. The rating of such fuel is expressed as a performance number (PN) which is defined as the maximum knock-free power output obtained from the fuel expressed as a percentage of the power obtainable on *iso*octane.

The antiknock rating of fuel varies according to the air/fuel mixture strength employed. This fact is used in defining the performance requirements of the higher grade aviation fuels. As mixture strength is increased (richened), the additional fuel acts as an internal coolant and suppresses knocking combustion which, in turn, permits a higher power rating to be obtained. Since maximum power output is the prime requirement of an engine under rich takeoff conditions, the "rich mixture performance" of a fuel is determined in a special supercharged single-cylinder engine using ASTM Test for Knock Characteristics of Aviation Fuels by the Supercharge Method (D 909/IP 119). Similarly, economic cruising operation of an engine is obtainable with weak (lean) mixture strengths. "Weak mixture performance" is determined by

ASTM Test for Knock Characteristics of Motor and Aviation Fuels by the Motor Method (D 2700/IP 236).

Until 1975, ASTM Specification for Aviation Gasolines (D 910) designated aviation gasoline grades with two numbers, for example, "grade 100/130." The lower number denoted an antiknock of 100 minimum by the lean mixture test procedure, and the higher number 130 minimum by the rich mixture procedure. Although the ASTM specification now uses only one number to designate grade (the number from the lean mixture procedure) some other specifications still use both.

Volatility

All internal combustion engine fuels must be easily convertible from storage in the liquid form to the vapor phase in the engine to allow formation of the combustible air/fuel vapor mixture. If gasoline fuel volatility is too low, liquid fuel enters the cylinders and washes lubricating oil from the walls and pistons. This would increase engine wear and cause dilution of the crankcase oil. Poor volatility can also give rise to critical maldistribution of mixture strength between cylinders. If volatility is too high, fuel can vaporize in the fuel tank and supply lines giving undue venting losses and the possibility of fuel starvation through "vapor lock" in the fuel lines. The cooling effect due to rapid vaporization of excessive amounts of highly volatile material also can cause ice formation in the carburetor under certain conditions of humidity and air temperature. Many modern aircraft have anti-icing devices on the engines including the provision of carburetor heating.

Distillation characteristics are determined with a procedure (ASTM D 86/IP 123) in which a sample of the fuel is distilled and the vapor temperature recorded for the percentages of evaporation or distillation throughout the range. Distillation points are selected to control volatility in the following ways:

1. The percent evaporated at 75°C (167°F) controls front-end volatility. Not less than 10%, but not more than 40% of the fuel must evaporate at that temperature. The minimum value ensures that volatility is adequate for normal cold starting. The maximum value controls vapor lock, fuel system vent losses, and carburetor icing.

2. The requirement that at least 50% of the fuel be evaporated at 105°C (221°F) ensures that the fuel has even distillation properties and does not consist of low-boiling and high-boiling components only. This provides control over the rate of engine warm-up and stabilization of slow-running conditions.

3. The requirement that the sum of the 10 and 50 percent evaporated temperatures exceed 135°C (307°F) also controls the overall volatility and indirectly places a lower limit on the 50 percent point. The clause is an additional safeguard against excessive fuel volatility.

4. The requirement that a minimum of 90% of the fuel be evaporated at 135°C (275°F) controls the proportion of less volatile fuel components and, therefore, the amount of unvaporized fuel passing through the engine manifold into the cylinders. The limit represents a compromise between ideal fuel distribution characteristics and commercial considerations of fuel availability which could be affected adversely by further restriction of this limit.

5. The final distillation temperature of 170°C (338°F) maximum excludes any undesirable heavy material which could cause fuel maldistribution and also dilution of the crankcase oil.

All spark-ignition engine fuels have a vapor pressure which is a measure of the tendency of the more volatile fuel components to escape from the fuel tank in the form of vapor. When an aircraft climbs rapidly to a high altitude, the atmospheric pressure over the fuel is reduced and may become less than the vapor pressure of the fuel at its prevailing temperature. If this occurs, the fuel will "boil," and considerable quantities of the more volatile components will escape as vapor through the tank vents.

Vapor pressure for aviation gasolines is controlled and determined by the ASTM Test for Vapor Pressure of Petroleum Products (Reid Method) (D 323/IP 69). Limits are between 38 and 49kPa (5.5 to 7.0 psi). The lower limit is an additional check on adequate volatility for engine starting. The up-

per limit controls excessive vapor formation during high-altitude flight and "weathering" losses in storage.

Density and Heat of Combustion

No great variation in either density or heat of combustion occurs in modern aviation gasolines since they depend on hydrocarbon composition which is already closely controlled by other specification properties. Both factors have relatively greater importance with jet fuels as discussed in detail later.

Freezing Point

Maximum freezing point values are set for all types of aviation fuel as a guide to the lowest temperature at which the fuel can be used without risk of separation of solidified hydrocarbons. Such separation could lead to fuel starvation through clogging of fuel lines or filters or loss in available fuel load due to retention of solidified fuel in the tanks. The low freezing point requirement also virtually precludes the presence of benzene which, while a high octane material, has a very high freezing point.

The standard freezing-point test involves cooling the fuel until a slurry of crystals form throughout the fuel and noting the temperature at which all crystals disappear on rewarming the fuel. Freezing points are determined by ASTM Test for Freezing Point of Aviation Fuels (D 2386/IP 16).

Storage Stability

Aviation fuel must retain its required properties for long periods of storage in all kinds of climates. Unstable fuels oxidize and form polymeric oxidation products which remain as a resinous solid or "gum" on induction manifolds, carburetors, valves, etc. as the gasoline is evaporated. Formation of this undesirable gum must be limited strictly, and it is assessed by the existent and accelerated (or potential) gum tests.

The existent gum value is the amount of gum actually present in the fuel at the time of the test. It is determined by ASTM Test for Existent Gum in Fuels by Jet Evaporation (D 381/IP 131). The accelerated gum test, ASTM Test for Oxidation Stability of Aviation Fuels (Potential Residue Method) (D 873/IP 138), predicts the possibility of gum forming during protracted storage and decomposition and precipitation of the antiknock additive.

To ensure that the strict limits of the stability specification clauses are met, aviation gasoline components are given special refining treatments to remove the trace impurities responsible for instability. In addition, limited quantities of approved oxidation inhibitors are added. Currently, little trouble is experienced with gum formation or degradation of antiknock additive.

Sulfur Content

Total sulfur content of aviation gasoline is limited to 0.05 percent mass maximum because most sulfur compounds have a deleterious effect on the antiknock efficiency of alkyl lead compounds. If sulfur content were not limited, specified antiknock values would not be reached for highly leaded grades of aviation fuel. Sulfur content is estimated by ASTM Test for Sulfur in Petroleum Products (Lamp Method) (D 1266/IP 107) or X-Ray Spectrographic Method (D 2622).

Some sulfur compounds can have a corroding action on the various metals of the engine system. Effects vary according to the chemical type of sulfur compound present. Fuel corrosivity is assessed by its action on a copper strip used in ASTM Test for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test (D 130/IP 154).

Water Reaction

The original intent of the water reaction test was to prevent the addition of high octane and water soluble components such as alcohol to aviation gasoline. The test methods involved shaking 80 mL of fuel with 20 mL of water under standard conditions and observing phase volume changes and interface condition. Many specifications for aviation gasoline now have phase separation requirements in addition to those for volume change and interface condition. Water Reaction of Aviation Fuels (D 1094/IP 289) rates all three of these criteria.

Automotive (Motor) Gasoline—Use In Aircraft

In general and at the date of this printing, reciprocating aviation engines and the fuel systems in aircraft so powered are designed to operate on one of the grades of fuel specified in ASTM Specification for Aviation Gasolines (D 910), or equivalent. Most major aviation piston engine manufacturers specifically exclude motor gasoline from their list of approved fuels. Many fuel manufacturers also disapprove of the use of motor gasolines in any aircraft. The suitability of motor gasoline for use in aircraft is limited for both technical and safety reasons which are explained below.

Motor gasoline can vary in both composition and quality from supplier to supplier, from country to country, and, in temperate climates, from season to season; in comparison to aviation gasoline, motor gasoline is not a closely or uniformly specified product. A particular variable in recent years is the increasing inclusion of strong detergent additives and of alcohols and/or other oxygenates in motor gasoline.

Availability and cost considerations have encouraged many owners of light aircraft to seek acceptance of motor gasoline as an alternative to aviation gasoline. In recognition of this trend and in order to maintain regulation and control of motor gasoline use, various civil aviation regulatory agencies around the world have extended supplemental or special certification provisions to permit the use of motor gasoline in a limited number of specified aircraft types which are considered, because of design features, to be less sensitive to fuel properties. In the United States of America, such supplemental type certificates (STCs) specify motor gasoline meeting the requirements of ASTM Specification for Automotive Gasoline (D 439). However, the responsibility for any consequences arising from the adoption of alternative fuels such as motor gasoline rests with the owner/operator of the aircraft, the parties who have sought and received approval, and the regulatory agencies that granted said approvals.

The compositional and property differences between motor gasoline and aviation gasoline are detailed below in relation to their potential adverse effects on engine/aircraft operation and flight safety. These factors should be reviewed and evaluated before use of motor gasoline in aircraft.

1. Motor gasolines have a wider distillation range than aviation fuels. This could promote poor distribution of the high antiknock components of the fuel in some carbureted engines. Further, the octane ratings of motor gasoline and aviation gasoline are not comparable due to the different test methods used to rate the two types of fuels. Preignition and detonation conditions could develop due to the appreciable difference in actual antiknock performance of motor and aviation fuels of apparent similar octane ratings.

2. Higher volatility and vapor pressures of motor gasolines could overtax the vapor handling capabilities of certain engine/airframe combinations and could lead to vapor lock or carburetor icing. Fire hazards could also be increased.

3. Motor gasoline has a shorter storage stability lifetime than aviation gasoline and can form gum deposits which can induce poor mixture distribution and other engine mechanical side effects such as valve sticking.

4. Due to higher aromatics content and the possible presence of oxygenates, motor gasoline could have solvent characteristics which are unsuitable for some aircraft engine/airframe combinations. Seals, gaskets, flexible fuel lines, and some fuel tank materials could be affected.

5. Motor gasoline may contain additives which could prove incompatible with certain in-service engine or airframe components. The concentration of additives such as detergents is being continually revised to meet the requirements of advanced automotive fuel injection systems. Alcohols or other oxygenates could increase the tendency for the fuel to hold water, either in solution or in suspension. Other additives, not considered here, could also lead to problems not specifically addressed in this document.

6. The testing and quality protection measures applied to automotive gasoline are much less stringent than for aviation fuels. There is a greater possibility of contamination occurring and less possibility of it being detected. Because motor

gasolines meet less stringent requirements, compositional extremes still meeting D 439 might cause undefined difficulties in certain aircraft. Furthermore, D 439 is being continually revised.

7. The antiknock compounds used in leaded motor gasolines contain an excess of chlorine and bromine-containing lead scavengers, whereas aviation gasolines contain a lesser concentration of bromine compounds only. Chlorine compounds give more corrosive combustion products. In addition, lead phasedown regulations in some countries may result in motor gasoline containing insufficient lead to prevent excessive valve seat wear in certain engines.

The above factors illustrate that use of motor gasoline in aircraft may involve certain risks that the potential user must assess.

AVIATION TURBINE FUELS (JET FUELS)

Background

Aircraft gas-turbine engines require a fuel with quite different properties from those for aviation gasoline. Probably the greatest difference is that antiknock value is of no importance and is replaced by the need for a heating fuel of good combustion characteristics and high-energy content. Illuminating kerosine was chosen as the fuel for the first generation of engines largely because of its ready availability, low-fire hazard, good combustion properties, and, not least, the war-time need to conserve gasoline supplies. As engine and fuel system designs have become more complicated, so have the fuel specifications become more varied and restrictive.

Jet fuel quality worldwide is dictated on the commercial side largely by the British Ministry of Defence (DERD) specifications and those of the airlines, engine manufacturers, and industry groups such as ASTM and the International Air Transport Associations (IATA). At airports around the world, jet fuel for airlines is delivered frequently from jointly operated systems in which fuel from a number of suppliers is comingled. This practice has led to the development of a Joint Fueling Systems Check List, which embraces the most critical requirements of the major specifications.

Military jet fuel is dictated largely by the U.S. Department of Defense (U.S. MIL) specifications and corresponding DERD specifications. Grades of commercial and military fuels are virtually identical in basic properties and differ mainly in the types of additives permitted. The only significant exception is in the case of the fuel types used in the Soviet Union and most East European countries. These grades are based on USSR state standards (GOST specifications) and differ in several major respects from their nearest "Western" equivalents.

In the People's Republic of China, early grades of aviation turbine fuel were also based on USSR Standards, but, for recently introduced grades, Western standards and test methods are being adopted.

Only two basic types of jet fuel are in general use worldwide: the kerosine type and the wide-cut gasoline type. The former is a modified development of the illuminating kerosine originally used in gas-turbine engines. The latter is a wider boiling-range material which includes some gasoline fractions, developed in the United States of America primarily for military use, to improve on availability from crude oil. In addition, a number of specialized fuel grades are required for limited military use either as referee fuels or, more particularly, in special high-performance military aircraft.

Composition and Manufacture

Aviation turbine fuels are manufactured predominantly from straight-run kerosines, or kerosine/naphtha blends in the case of wide-cut fuel, from the atmospheric distillation of crude oil. Straight run kerosine from some sweet crudes will meet all the requirements of the jet fuel specification without further refinery processing, but for the majority of crudes, the kerosine fraction will contain trace constituents which have to be removed before the kerosine is merchantable as jet fuel. This is normally effected by hydrotreating (hydrofining) or by a chemical sweetening process (for example, Merox). For further detail on

Fuels Survey 20:10 Tuesday, October 18, 1994

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup et al.

RVP <= 7.5 psi and Grade = Unleaded

Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
1	1.7	.	.	.	.	.		.	.	.	.	.	.	92.2		US4,571,439	6	5		polymer gas
2	1.7	.	.	.	.	.		.	.	.	.	.	.	92.2		US4,579,990	4	40		polymer gas
3	2.6	.	.	0.0	72.6	27.4	*	100	.	.	.	.	.	98.5		US5,041,208	11	64	Pt-USDY	cat gas
4	3.0	231	326	3.5	43.0	53.5		100	.	.	.	.	.	89.7		US4,437,436	9	50	B	
5	3.6	.	.	0.0	47.5	52.5	*	100	.	.	.	.	.	94.1		US5,041,208	11	30	HDT	cat gas
6	3.6	.	.	0.0	50.3	49.7	*	100	.	.	.	.	.	94.5		US5,041,208	11	30	Pt-USDY	cat gas
7	3.8	284	368	.	.	.		.	.	.	.	.	.	86.5		US4,818,250	8	63	20/80	
8	4.1	177	207	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	A	2 comp T10=159
9	5.0	200	316	2.3	34.0	63.7		100	30.0	.	.	.	.	86.8		SAE 801352	11	App A-1	R-30	
10	5.1	258	378	6.1	24.8	69.1		100	.	.	.	.	.	86.7		SAE 780949	13	App B-3	9R	T10=184
11	5.2	247	.	22.8	30.5	46.6		100	.	.	.	.	.	84.8		US5,041,208	10	41	full	cat gas
12	5.2	234	312	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	4	
13	5.2	230	330	0.3	24.9	74.8	*	100	.	.	.	.	.	84.5		CRC 510	18	II,I	1	
14	5.2	216	227	.	.	.		.	10.0	.	.	.	.	101.0		US4,812,146	6	18	9	>57% arom
15	5.2	213	304	18.0	29.5	52.5	*	100	.	.	.	.	.	86.1		CRC 477	17	II,I	2	
16	5.2	.	.	22.8	30.5	46.7	*	100	.	.	.	.	.	84.8		US5,041,208	12	42	Joliet	cat gas
17	5.3	235	307	12.1	28.4	59.5	*	100	.	.	.	.	.	95.6		BM 7291	4,40	1	4	
18	5.3	207	308	19.0	27.5	53.5	*	100	.	.	.	.	.	91.5		CRC 477	17	II,I	13	
19	5.3	186	314	18.1	23.2	58.7		100	30.0	.	.	.	.	86.6		SAE 801352	11	App A-1	F-30	
20	5.4	231	323	15.0	37.5	47.5		100	.	.	.	.	.	86.3		SAE 770811	7	A-1	F-11	
21	5.4	205	302	18.0	28.5	53.5	*	100	.	.	.	.	.	88.8		CRC 477	17	II,I	6	
22	5.4	205	301	5.4	23.5	71.1	*	100	.	.	.	.	.	83.7		CRC 494	20	II,I	1	
23	5.4	201	338	.	.	.		.	.	.	.	.	.	.		CRC 578	19	3	B	
24	5.5	256	361	35.5	28.5	36.0		100	.	.	.	.	.	86.3		SAE 770811	8	A-1	F-18	
25	5.5	235	335	.	.	.		.	.	.	.	.	.	91.9		CRC 541	15	III,II	15	
26	5.5	223	330	20.5	36.0	43.5		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-6	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

ATTACHMENT P

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
27	5.6	243	340	.	.	.		.	.	.	.	.	.	.		CRC 578	19	3	D	
28	5.7	253	328	.	.	.		.	.	.	.	.	.	.		CRC 455	40	III	B-10	
29	5.7	235	335	.	.	.		.	.	.	.	.	.	87.9		US4,444,567	3	57	FT-266	Burns T10=164
30	5.7	218	294	0.6	22.3	77.1	*	100	.	.	.	.	.	90.9		CM-79-71	16	II,I	9	
31	5.7	216	325	1.5	40.4	58.1		100	15.0	.	.	.	.	86.4		SAE 801352	11	App A-1	R-15	
32	5.7	216	229	.	.	.		.	10.0	.	.	.	.	100.7		US4,812,146	4	14	1	>52% arom
33	5.7	215	303	.	.	.		.	.	.	.	.	.	.		CRC 455	39	II	A-10	
34	5.8	236	317	1.5	22.8	75.7	*	100	.	.	.	.	.	86.4		CM-79-71	16	II,I	1	
35	5.8	225	330	18.1	17.5	64.4	*	100	.	.	.	.	.	85.6		CRC 510	18	II,I	2	
36	5.8	224	322	2.1	43.4	54.5		100	5.0	.	.	.	.	86.4		SAE 801352	11	App A-1	R-5	
37	5.9	235	343	.	.	.		.	.	.	.	.	.	.		AP213,136	9		b	
38	6.0	257	346	.	48.0	.	*	.	.	.	.	.	.	92.9		CRC 520	19	III,I	16	
39	6.0	257	346	.	48.0	.	*	.	.	.	.	.	.	92.9		SAE 821211	3	1,2	16	
40	6.0	233	356	.	.	.		.	.	.	.	.	.	.		SAE 780611	169	Fig 5	6A	
41	6.0	223	332	2.0	19.5	78.5	*	100	.	.	.	.	.	87.9		CRC 477	17	II,I	12	
42	6.0	223	330	2.0	19.5	78.5	*	100	.	.	.	.	.	85.6		CRC 477	17	II,I	5	
43	6.0	222	334	22.7	13.4	63.9	*	100	.	.	.	.	.	84.3		CM-79-71	16	II,I	2	
44	6.0	220	330	2.0	20.0	78.0	*	100	.	.	.	.	.	82.4		CRC 477	17	II,I	1	
45	6.0	217	328	11.5	39.0	49.5		100	.	.	.	.	.	87.6		SAE 770811	7	A-1	F-14	
46	6.0	216	229	.	.	.		.	10.0	.	.	.	.	100.6		US4,812,146	4	39	6	>52% arom
47	6.0	198	303	.	.	.		.	.	.	.	.	.	.	P	SAE 780651	4	2	low	
48	6.1	226	323	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	BL	
49	6.1	224	335	.	30.0	.	*	.	.	.	.	.	.	90.6		CRC 520	19	III,I	10	
50	6.1	224	335	.	30.0	.	*	.	.	.	.	.	.	90.6		SAE 821211	3	1,2	10	
51	6.1	220	325	1.5	41.3	57.2		100	10.0	.	.	.	.	86.3		SAE 801352	11	App A-1	R-10	
52	6.1	220	312	0.3	23.4	76.3	*	100	.	.	.	.	.	89.2		CRC 510	18	II,I	9	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
53	6.1	212	326	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XE	
54	6.1	170	208	.	.	.		.	.	.	.	.	.	.		SAE 780612	175	2	B	2 comp
55	6.2	254	370	.	.	.		.	.	.	.	.	.	.		SAE 750419		App 1	A	
56	6.2	226	331	1.6	44.6	53.8		100	.	.	.	.	.	86.4		SAE 801352	11	App A-1	R-0	
57	6.2	216	228	.	.	.		.	8.0	.	.	.	.	100.5		US4,812,146	4	39	5	>52% arom
58	6.2	215	314	8.5	32.0	59.5	*	100	.	.	.	.	.	88.5		CRC 477	17	II,I	11	
59	6.2	212	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	1	
60	6.3	251	336	.	.	.		.	.	.	.	.	.	90.1		CRC 541	15	III,II	28	
61	6.3	236	344	.	23.0	.	*	.	.	.	.	.	.	87.1		CRC 520	19	III,I	3	
62	6.3	236	344	.	23.0	.	*	.	.	.	.	.	.	87.1		SAE 821211	3	1,2	3	
63	6.3	233	356	.	.	.		.	.	.	.	.	.	.		SAE 780611	166	4	6A	
64	6.3	224	346	22.5	26.7	50.8	*	100	.	.	.	.	.	88.0		CM-79-71	16	II,I	12	
65	6.3	217	229	.	.	.		.	10.0	.	.	.	.	100.9		US4,812,146	5	41	9	>57% arom
66	6.3	210	352	.	.	.		.	.	.	.	.	.	.		AP213,136	11		a	
67	6.3	195	333	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	AL	
68	6.3	194	300	1.6	27.0	71.4	*	100	.	.	.	.	.	87.2		CRC 494	20	II,I	6	
69	6.4	244	336	.	38.0	.	*	.	.	9.8	.	.	.	89.1		CRC 520	19	III,I	9	
70	6.4	244	336	.	38.0	.	*	.	.	9.8	.	.	.	89.1		SAE 821211	3	1,2	9	
71	6.4	240	343	.	28.0	.	*	.	.	.	.	.	.	91.0		CRC 520	19	III,I	13	
72	6.4	240	343	.	28.0	.	*	.	.	.	.	.	.	91.0		SAE 821211	3	1,2	13	
73	6.4	236	329	.	27.0	.	*	.	.	.	.	.	.	91.2		CRC 520	19	III,I	12	
74	6.4	236	329	.	27.0	.	*	.	.	.	.	.	.	91.2		SAE 821211	3	1,2	12	
75	6.4	226	323	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	7	
76	6.4	218	327	1.0	40.5	58.5		100	.	.	.	.	.	84.4		SAE 770811	7	A-1	F-3	
77	6.4	206	300	6.0	42.0	52.0	*	100	.	.	.	.	.	92.5		CRC 477	17	II,I	14	
78	6.4	203	315	17.5	30.9	51.6	*	100	.	.	.	.	.	85.1		CM-79-71	16	II,I	8	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
79	6.4	197	295	15.7	25.3	59.0		100	.	.	.	.	.	86.8		SAE 730474	1444	1	A	
80	6.4	195	334	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	5	
81	6.5	257	339	.	.	.		.	.	.	.	.	.	.		SAE 780611	164	2	B1	
82	6.5	217	228	.	.	.		.	10.0	.	.	.	.	100.9		US4,812,146	4	39	2	>56% arom
83	6.5	215	328	12.0	37.5	50.5		100	.	.	.	.	.	86.5		SAE 770811	7	A-1	F-9	
84	6.5	199	336	.	.	.		.	.	.	.	.	.	.		CRC 578	18	2	2	
85	6.5	.	.	.	.	.		.	.	.	.	.	.	.		US3,886,759	5	35		
86	6.6	260	335	7.0	53.0	40.0		100	.	.	.	.	.	.		SAE 790203	5	A-2	FO-16	
87	6.6	252	366	.	.	.		.	.	.	.	.	.	87.0		US4,818,250	8	63	10/90	
88	6.6	245	318	1.0	27.3	71.7	*	100	.	.	.	.	.	87.9		CM-79-71	16	II,I	6	
89	6.6	243	344	.	31.6	.	*	.	.	.	.	.	.	91.3		HES 35-32030	11	9	6.5	Avg of 3
90	6.6	234	335	.	.	.		.	.	.	.	.	.	.		SAE 720932	15	App A	I	
91	6.6	232	318	4.0	28.3	67.7	*	100	.	.	.	.	.	89.1		CRC 445	17	II	2	
92	6.6	232	318	4.0	28.0	68.0	*	100	.	.	.	.	.	89.1		CRC 451	19	III	I-2	
93	6.6	232	318	4.0	28.0	68.0	*	100	.	.	.	.	.	89.1		SAE 710675	2	2	2	
94	6.6	232	315	4.0	26.0	70.0	*	100	.	.	.	.	.	90.9		CRC 451	19	III	T (b)	
95	6.6	231	338	.	.	.		.	4.5	.	.	.	.	90.9		CRC 541	15	III,II	24	
96	6.6	226	359	4.3	21.7	74.0		100	.	.	.	.	.	87.6		API 4310	8	I	I	
97	6.6	225	338	.	.	.		.	9.6	.	.	.	.	92.0		CRC 541	15	III,II	25	
98	6.6	183	360	15.0	16.1	68.9		100	.	.	.	.	.	74.4		CRC 454	22	II	AU-8-79	
99	6.6	.	.	4.5	40.2	55.3		100	.	.	.	.	.	90.8		SAE 900153	2	1	ES2	T50>215
100	6.7	241	343	.	.	.		.	.	.	.	.	.	.		CRC 578	18	2	4	
101	6.7	241	335	.	34.0	.	*	.	.	.	.	.	.	89.9		CRC 520	19	III,I	8	
102	6.7	241	335	.	34.0	.	*	.	.	.	.	.	.	89.9		SAE 821211	3	1,2	8	
103	6.7	232	336	19.7	40.5	39.8	*	100	.	.	.	.	.	87.5		SAE 780612	175	2	3	
104	6.7	220	330	.	.	.		.	15.0	.	.	.	.	.		CRC 578	18	2	9	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
105	6.7	220	317	9.9	24.3	65.8	*	100	.	.	.	.	.	87.3		CM-79-71	16	II,I	13	
106	6.7	213	302	3.8	14.2	82.0	*	100	.	.	.	.	.	86.7		CRC 510	18	II,I	5	
107	6.7	210	334	.	.	.		.	.	.	.	.	.	.	P	SAE 720933	2714	App A-1	6	
108	6.7	210	302	.	.	.		.	.	.	.	.	.	.		CRC 455	39	II	A-20	
109	6.7	.	.	11.3	49.4	39.3	*	100	.	.	.	.	.	91.8		US5,041,208	12	42	Net prod	cat gas
110	6.8	246	341	.	30.0	.	*	.	.	.	.	.	.	87.4		CRC 520	19	III,I	5	
111	6.8	246	341	.	30.0	.	*	.	.	.	.	.	.	87.4		SAE 821211	3	1,2	5	
112	6.8	232	325	15.0	40.5	44.5		100	.	.	.	.	.	.		SAE 790203	5	A-2	FO-17	
113	6.8	228	338	.	.	.		.	.	.	.	.	8.7	90.9		CRC 541	15	III,II	23	
114	6.8	227	350	.	27.0	.	*	.	.	.	.	.	.	92.7		CRC 520	19	III,I	15	
115	6.8	227	350	.	27.0	.	*	.	.	.	.	.	.	92.7		SAE 821211	3	1,2	15	
116	6.8	217	341	2.9	26.7	70.4		100	.	.	.	.	.	91.7		API 4310	8	I	II	
117	6.8	217	229	.	.	.		.	10.0	.	.	.	.	100.6		US4,812,146	4	39	4	>52% arom
118	6.8	216	326	10.9	24.7	64.4	*	100	.	.	.	.	.	88.8		CRC 510	18	II,I	13	
119	6.8	208	335	.	.	.		.	.	.	.	.	.	.		SAE 780611	164	2	A1	
120	6.8	198	305	.	.	.		.	.	.	.	.	.	.		SAE 720932	15	App A	III	
121	6.8	195	286	32.2	9.0	58.8		100	.	.	.	.	.	74.4		CRC 454	23	III	AU-10-79	
122	6.8	191	325	.	.	.		.	.	.	23.5	.	.	92.9		SAE 902132	2	2	F	
123	6.8	191	319	.	.	.		.	.	.	.	.	.	.		SAE 730593	2107	App A-1	V-4	
124	6.8	185	331	.	.	.		.	.	10.0	.	.	.	.		CRC 578	18	2	12	
125	6.8	181	328	.	.	.		.	15.0	.	.	.	.	.		CRC 578	18	2	7	
126	6.8	180	283	.	.	.		.	.	.	.	.	.	.	P	SAE 841386	8	App A	2	
127	6.9	246	329	.	.	.		.	.	.	.	.	.	.		CRC 455	40	III	B-20	
128	6.9	240	294	12.4	59.8	27.8		100	.	.	.	.	.	94.2		CRC 519	D-6	D-V	331	
129	6.9	240	294	12.4	59.8	27.8		100	.	.	.	.	.	94.2		CRC 525	C-4	C-IV	331-80	
130	6.9	238	296	1.6	50.8	47.6		100	.	.	.	.	.	95.5		CRC 519	D-5	D-V	328	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
131	6.9	238	296	1.6	50.8	47.6		100	.	.	.	.	.	95.5		CRC 525	C-1	C-I	328-80	
132	6.9	234	336	.	.	.		.	.	10.0	.	.	.	.		CRC 578	18	2	14	
133	6.9	232	337	.	.	.		.	.	.	.	4.7	.	90.8		CRC 541	15	III,II	20	
134	6.9	232	337	.	.	.		.	.	.	.	.	4.5	90.5		CRC 541	15	III,II	22	
135	6.9	228	335	.	.	.		.	.	.	.	.	.	86.7		CRC 541	15	III,II	2	
136	6.9	227	345	21.7	33.1	45.2	*	100	.	.	.	.	.	85.7		CM-79-71	16	II,I	16	
137	6.9	226	335	.	.	.		.	.	.	.	9.3	.	91.7		CRC 541	15	III,II	21	
138	6.9	224	304	1.0	34.0	65.0	*	100	.	.	.	.	.	89.7		CRC 451	19	III	S	
139	6.9	216	301	5.7	33.3	61.0	*	100	.	.	.	.	.	86.2		CM-79-71	16	II,I	3	
140	6.9	214	337	3.4	35.4	61.2		100	.	.	.	.	.	86.9		SAE 780949	13	App B-3	8R	
141	6.9	.	.	18.8	31.4	49.8		100	.	.	.	.	.	90.9		SAE 900153	2	1	ES3	T50>215
142	7.0	237	341	.	.	.		.	.	.	.	.	.	90.1		CRC 541	15	III,II	14	
143	7.0	234	294	11.6	27.5	60.9	*	100	.	.	.	.	.	90.2		CRC 494	20	II,I	8	
144	7.0	233	312	.	38.0	.	*	.	.	9.8	.	.	.	90.0		CRC 520	19	III,I	7	
145	7.0	233	312	.	38.0	.	*	.	.	9.8	.	.	.	90.0		SAE 821211	3	1,2	7	
146	7.0	232	327	13.9	26.1	60.0	*	100	.	.	.	.	.	93.4		CRC 510	18	II,I	12	
147	7.0	231	327	1.5	29.7	68.8	*	100	.	.	.	.	.	91.1		CRC 510	18	II,I	11	
148	7.0	229	.	.	.	.		.	.	.	.	.	.	.	P	SAE 710136	9	2	V	
149	7.0	226	312	4.7	32.0	63.3		100	.	.	.	.	.	86.7		SAE 780949	13	App B-3	11R	
150	7.0	226	311	1.0	21.8	77.2	*	100	.	.	.	.	.	89.3		CRC 494	20	II,I	9	
151	7.0	226	253	5.1	70.9	24.0		100	.	.	.	.	.	95.9		CRC 515	D-6	D-V	325	
152	7.0	224	367	35.1	18.6	46.3		100	.	.	.	.	.	79.9		CRC 451	103	D-XI	242-71	
153	7.0	223	339	.	20.0	.	*	.	.	.	.	.	.	86.4		CRC 520	19	III,I	1	
154	7.0	223	339	.	20.0	.	*	.	.	.	.	.	.	86.4		SAE 821211	3	1,2	1	
155	7.0	221	319	3.0	16.5	80.5	*	100	.	.	.	.	.	91.5		CRC 494	20	II,I	10	
156	7.0	216	314	11.6	14.5	73.9	*	100	.	.	.	.	.	92.1		CRC 510	18	II,I	10	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
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Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
157	7.0	215	314	24.3	15.9	59.8	*	100	.	.	.	.	.	91.3		CRC 510	18	II,I	7	
158	7.0	214	347	16.3	11.6	72.1		100	.	.	.	.	.	88.5		US4,313,738	2	62	FT-116	.28 wt% S
159	7.0	214	347	16.3	11.6	72.1		100	.	.	.	.	.	88.5		US4,322,304	3	60	FT-116	.28 wt% S
160	7.0	214	323	.	.	.		.	.	.	.	.	.	.		SAE 892090	4	5	first	
161	7.0	212	309	9.7	22.8	67.5	*	100	.	.	.	.	.	88.3		CRC 494	20	II,I	13	
162	7.0	211	328	21.0	32.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-4	
163	7.0	210	310	7.5	31.5	61.0	*	100	.	.	.	.	.	88.4		CRC 477	17	II,I	8	
164	7.0	208	340	14.0	20.0	66.0		100	.	.	.	.	.	74.9		CRC 493	114	D-V	286	
165	7.0	208	317	10.5	28.5	61.0	*	100	.	.	.	.	.	90.8		CRC 477	17	II,I	15	
166	7.0	205	319	17.9	28.3	53.8	*	100	.	.	.	.	.	83.4		CM-79-71	16	II,I	4	
167	7.0	204	321	21.0	30.5	48.5		100	.	.	.	.	.	86.1		SAE 770811	7	A-1	F-12	
168	7.0	204	291	12.6	8.3	79.1	*	100	.	.	.	.	.	87.8		CM-79-71	16	II,I	14	
169	7.0	195	299	9.8	16.0	74.2		100	.	.	.	.	.	86.8		CRC 454	22	II	AU-8-91	
170	7.0	195	293	10.8	21.1	68.1		100	.	.	.	.	.	87.4		CRC 467	96	D-IV	261	
171	7.0	195	293	10.8	21.1	68.1		100	.	.	.	.	.	87.4		CRC 476	48	D-IV	261	
172	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.8		CRC 445	86	D-IX	239-71	
173	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.5		CRC 451	103	D-XI	239-71	
174	7.0	194	348	12.0	15.1	72.9		100	.	.	.	.	.	82.8		SAE 710675	15	A-3	239-71	
175	7.0	192	325	22.0	25.8	52.2		100	15.0	.	.	.	.	85.9		SAE 801352	11	App A-1	F-15	
176	7.1	226	311	.	22.0	.	*	.	.	6.9	.	.	.	86.4		CRC 520	19	III,I	2	
177	7.1	226	311	.	22.0	.	*	.	.	6.9	.	.	.	86.4		SAE 821211	3	1,2	2	
178	7.1	225	303	9.2	28.8	62.0	*	100	.	.	.	.	.	87.7		CM-79-71	16	II,I	24	
179	7.1	220	308	1.7	33.0	65.3	*	100	.	.	.	.	.	89.3		CM-79-71	16	II,I	11	
180	7.1	220	229	.	.	.		.	0.0	.	.	.	.	100.5		US4,812,146	5	12	8	>60% arom
181	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		CRC 467	96	D-IV	265	
182	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		CRC 476	48	D-IV	265	

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
183	7.1	215	285	7.1	33.4	59.5		100	.	.	.	.	.	94.0		SAE 750937	6	6	265	
184	7.1	214	301	11.4	16.6	72.0	*	100	.	.	.	.	.	89.2		CM-79-71	16	II,I	10	
185	7.1	209	325	10.0	19.6	70.4		100	.	.	.	.	.	76.9		CRC 570	C-1	C-1	368-89/90	
186	7.1	209	325	10.0	19.6	70.4		100	.	.	.	.	.	76.9		CRC 575	C-1	C-1	368-89/90	
187	7.1	207	303	35.1	17.7	47.2	*	100	.	.	.	.	.	85.4		CM-79-71	16	II,I	7	
188	7.1	206	369	21.5	31.5	47.0		100	.	.	.	.	.	86.4		CRC 570	C-3	C-3	372-89/90	
189	7.1	206	369	21.5	31.5	47.0		100	.	.	.	.	.	86.4		CRC 575	C-3	C-3	372-89/90	
190	7.1	203	314	7.5	41.5	51.0	*	100	.	.	.	.	.	88.7		CRC 477	17	II,I	7	
191	7.1	203	307	0.5	19.0	80.5		100	.	.	.	.	.	86.0		SAE 770811	7	A-1	F-1	
192	7.1	202	344	11.1	18.2	70.7		100	.	.	.	.	.	86.0		CRC 519	D-5	D-V	327	
193	7.1	202	344	11.1	18.2	70.7		100	.	.	.	.	.	86.0		CRC 525	C-1	C-I	327-80	
194	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		CRC 467	96	D-IV	263	
195	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		CRC 476	48	D-IV	263	
196	7.1	195	310	15.0	21.7	63.3		100	.	.	.	.	.	80.5		SAE 750937	6	6	263	
197	7.2	244	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	3	
198	7.2	237	331	.	30.0	.	*	.	.	.	.	.	.	93.3		CRC 520	19	III,I	18	
199	7.2	237	331	.	30.0	.	*	.	.	.	.	.	.	93.3		SAE 821211	3	1,2	18	
200	7.2	236	336	2.1	41.9	56.0		100	.	.	.	.	.	89.1		US4,437,436	9	50	C	
201	7.2	232	334	14.0	39.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-3	
202	7.2	229	335	5.0	32.0	63.0		100	.	.	.	.	.	85.4		CRC 544	C-1	C-I	351-84	
203	7.2	229	335	5.0	32.0	63.0		100	.	.	.	.	.	85.4		CRC 548	C-1	C-I	351-84	
204	7.2	224	304	6.0	29.0	65.0	*	100	.	.	.	.	.	87.3		CRC 451	19	III	T	
205	7.2	220	367	35.0	18.0	47.0		100	.	.	.	.	.	80.4		CRC 445	86	D-IX	242-71PB	
206	7.2	220	367	35.0	18.0	47.0		100	.	.	.	.	.	80.4		SAE 710675	15	A-3	242-71PB	
207	7.2	214	309	13.5	30.0	56.5		100	.	.	.	.	.	86.1		CRC 454	23	III	AU-10-91	
208	7.2	213	353	15.0	9.3	75.6		100	.	.	.	.	.	87.7		US4,294,587	2	42	FT-175	Burns

1. * Saturates were calculated by difference: 100% - (aromatics + olefins).
2. Total of Olefins + Aromatics + Saturates.
3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
209	7.2	208	345	20.0	22.0	58.0		100	.	.	.	.	.	74.3		CRC 493	114	D-V	289	
210	7.2	207	286	6.0	23.0	71.0	*	100	.	.	.	.	.	85.2		SAE 750763	2	2	Clr Comm	
211	7.2	207	286	6.0	23.0	71.0	*	100	.	.	.	.	.	85.2		BERC/RI-76	7	2	Clr Comm	
212	7.2	204	311	17.0	19.0	64.0		100	.	.	.	.	.	75.4		CRC 497	143	D-V	292	
213	7.2	204	311	17.0	19.0	64.0		100	.	.	.	.	.	75.4		CRC 500	76	D-IV	292	
214	7.2	203	283	11.7	8.3	80.0		100	.	.	.	.	.	88.1		CRC 451	103	D-XI	240-71	
215	7.2	202	314	7.0	42.5	50.5	*	100	.	.	.	.	.	85.9		CRC 477	17	II,I	3	
216	7.2	198	317	14.3	15.8	69.9		100	.	.	.	.	.	81.5		CRC 467	96	D-IV	260	
217	7.2	198	317	14.3	15.8	69.9		100	.	.	.	.	.	81.5		CRC 476	48	D-IV	260	
218	7.2	197	311	0.0	47.0	53.0		100	.	.	.	.	.	96.2		CRC 493	114	D-V	288	
219	7.2	195	345	15.0	17.0	68.0		100	.	.	.	.	.	74.0		CRC 479	85	D-V	269	
220	7.2	195	220	7.0	28.0	65.0		100	.	.	.	.	.	89.3		SAE 730474	1444	1	C	
221	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 561	C-1	C-I	362-87/88	
222	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 566	D-7	D-III	362	
223	7.2	192	333	13.8	19.8	66.4		100	.	.	.	.	.	77.0		CRC 567	6	1	362-87/88	
224	7.3	235	330	14.0	39.0	47.0		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-5	
225	7.3	231	327	12.0	41.5	46.5		100	.	.	.	.	.	.		SAE 790203	5	A-1	FO-7	
226	7.3	230	333	3.2	29.1	67.7	*	100	.	.	.	.	.	88.8		CM-79-71	16	II,I	22	
227	7.3	230	329	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XF	
228	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		CRC 445	86	D-IX	243-71	
229	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		CRC 451	103	D-XI	243-71	
230	7.3	225	340	20.3	33.3	46.4		100	.	.	.	.	.	85.9		SAE 710675	15	A-3	243-71	
231	7.3	219	.	.	.	.		.	.	.	.	.	.	.	P	SAE 720700	23	App B-9	2	
232	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 523	D-3	D-III	335	
233	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 525	C-4	C-IV	335-81	
234	7.3	217	354	33.0	16.0	51.0		100	.	.	.	.	.	74.6		CRC 533	C-4	C-IV	335-81	

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3. P: No data but Probably Leaded. Cars used leaded fuel at this time.
4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
7. MTBE added to the reported saturate value. 3% unknowns reported.
8. Compositions in wt%, all others are in vol%. Compositions as reported.

Publications Pre 1991 in SN 08/077,243 f. 6/14/93 Jessup ctd.
RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
235	7.3	217	229	.	.	.		.	7.0	.	.	.	.	100.3		US4,812,146	4	39	7	>53% arom
236	7.3	212	314	11.0	31.0	58.0	*	100	.	.	.	.	.	88.2		CRC 477	17	II,I	10	
237	7.3	204	357	34.7	12.8	52.5		100	.	.	.	.	.	75.9		CRC 561	C-3	C-III	365-87/88	
238	7.3	204	357	34.7	12.8	52.5		100	.	.	.	.	.	75.9		CRC 566	D-7	D-III	365	
239	7.3	201	310	10.9	23.3	65.8	*	100	.	.	.	.	.	88.3		SAE 740520	3	2	10	
240	7.3	197	327	21.0	28.0	51.0		100	.	.	.	.	.	84.5		SAE 770811	7	A-1	F-6	
241	7.3	195	306	17.0	17.0	66.0		100	.	.	.	.	.	80.6		CRC 479	85	D-V	272	
242	7.3	187	325	28.0	21.5	50.5		100	15.0	.	.	.	.	86.2		SAE 801352	11	App A-1	F-15'	
243	7.3	.	.	.	.	.		.	.	.	.	.	.	90.4		US4,899,014	11	37	FG	cat gas
244	7.3	.	.	.	.	.		.	.	.	.	.	.	90.3		US4,899,014	11	37	FG+	cat gas
245	7.4	230	289	2.3	58.9	38.8		100	.	.	.	.	.	96.5		CRC 515	D-5	D-V	322	
246	7.4	225	296	5.0	49.0	47.0		101	.	.	.	.	.	96.2		CRC 493	114	D-V	291	
247	7.4	217	230	.	.	.		.	7.0	.	.	.	.	100.2		US4,812,146	4	39	3	>50% arom
248	7.4	216	313	9.5	30.0	60.5	*	100	.	.	.	.	.	85.9		CRC 477	17	II,I	4	
249	7.4	213	330	11.0	26.5	62.5		100	.	.	.	.	.	88.6		SAE 770811	7	A-1	F-13	
250	7.4	212	344	20.0	23.0	57.0		100	.	.	.	.	.	74.7		CRC 544	C-4	C-IV	353-84	
251	7.4	212	344	20.0	23.0	57.0		100	.	.	.	.	.	74.7		CRC 548	C-3	C-III	353-84	
252	7.4	205	318	11.0	20.0	69.0		100	.	.	.	.	.	86.3		CRC 493	114	D-V	287	
253	7.4	204	339	15.0	20.0	65.0		100	.	.	.	.	.	76.6		CRC 488	97	D-V	280	
254	7.4	203	284	11.0	9.0	80.0		100	.	.	.	.	.	88.1		CRC 445	86	D-IX	240-71PB	
255	7.4	203	284	11.0	9.0	80.0		100	.	.	.	.	.	88.1		SAE 710675	15	A-3	240-71PB	
256	7.4	202	339	5.0	19.0	76.0		100	.	.	.	.	.	87.6		SAE 790204	10	17	A	
257	7.4	202	339	5.0	19.0	76.0		100	.	.	.	.	.	87.6		SAE 790204	10	17	B	
258	7.4	202	286	5.0	53.0	42.0		100	.	.	.	.	.	96.3		CRC 488	97	D-V	282	
259	7.4	.	.	.	.	.		.	.	.	.	.	.	89.8		US4,873,389	10	18	1	cat gas
260	7.4	.	.	.	.	.		.	.	.	.	.	.	90.0		US4,873,389	10	18	2	cat gas

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4. US = U.S. patent, AP = Australian patent.
5. For patents page = column and table = line. 6. Repeat in CRC 451 Rvp= 7.7 psi.
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RVP <= 7.5 psi and Grade = Unleaded
Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Olefins	% Aromatics	% Saturates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
261	7.5	240	339	6.2	28.9	64.9		100	.	.	.	.	.	90.3		SAE 780949	12	App B-2	11P	
262	7.5	237	335	6.9	24.5	68.6	*	100	.	.	.	.	.	92.5		CRC 494	20	II,I	12	
263	7.5	234	339	.	.	.		.	.	4.3	.	.	.	91.1		CRC 541	15	III,II	18	
264	7.5	232	327	.	.	.		.	.	.	.	.	.	90.6		CM-125-78	139	C-8	ET-2 base	
265	7.5	232	312	3.8	50.4	45.8		100	.	.	.	.	.	97.3		CRC 570	C-3	C-3	373-89/90	
266	7.5	232	312	3.8	50.4	45.8		100	.	.	.	.	.	97.3		CRC 575	C-3	C-3	373-89/90	
267	7.5	230	337	.	.	.		.	.	8.4	.	.	.	91.9		CRC 541	15	III,II	19	
268	7.5	229	352	13.0	44.0	43.0		100	.	.	.	.	.	85.7		CRC 548	C-3	C-III	360-85/86	
269	7.5	229	352	13.0	44.0	43.0		100	.	.	.	.	.	85.7		CRC 553	C-3	C-III	360-85/86	
270	7.5	228	367	.	.	.		.	.	.	.	.	.	85.7		CRC 541	15	III,II	27	
271	7.5	220	292	0.1	30.5	69.4	*	100	.	.	.	.	.	87.1		CRC 510	18	II,I	6	
272	7.5	220	285	4.0	17.0	79.0		100	.	.	.	.	.	95.6		CRC 445	86	D-IX	241-71PB	(6)
273	7.5	220	285	4.0	17.0	79.0		100	.	.	.	.	.	95.6		SAE 710675	15	A-3	241-71PB	
274	7.5	218	300	3.1	29.9	67.0		100	.	.	.	.	.	94.5		CRC 467	96	D-IV	262	
275	7.5	218	300	3.1	29.9	67.0		100	.	.	.	.	.	94.5		CRC 476	48	D-IV	262	
276	7.5	218	289	12.5	23.7	63.8		100	.	.	.	.	.	94.5		CRC 451	103	D-XI	244-71	
277	7.5	218	286	3.2	46.4	50.4		100	.	.	.	.	.	98.5		CRC 570	C-1	C-1	370-89/90	
278	7.5	218	286	3.2	46.4	50.4		100	.	.	.	.	.	98.5		CRC 575	C-1	C-1	370-89/90	
279	7.5	216	363	10.1	24.0	62.9		97	4.9	.	.	.	.	87.7		SAE 902129	5	1	EC-1	10/90 (7)
280	7.5	216	282	6.9	32.4	60.7		100	.	.	.	.	.	94.8		SAE 730474	1444	1	B	
281	7.5	215	350	32.5	25.0	42.5	*	100	.	.	.	.	.	88.0		CRC 510	18	II,I	4	
282	7.5	214	344	.	.	.		.	9.7	.	.	.	.	87.9		CRC 541	15	III,II	12	
283	7.5	214	291	13.0	24.0	63.0		100	.	.	.	.	.	93.5		CRC 445	86	D-IX	244-71PB	
284	7.5	214	291	13.0	24.0	63.0		100	.	.	.	.	.	93.5		SAE 710675	15	A-3	244-71PB	
285	7.5	210	325	15.0	19.0	66.0		100	.	.	.	.	.	77.6		CRC 488	97	D-V	277	
286	7.5	209	320	.	.	.		.	.	.	.	.	.	.	P	SAE 710138	2	2	XC	

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Sorted first by increasing RVP, then by decreasing T50, and then by decreasing T90

OBS	Rvp (psi)	T50 (F)	T90 (F)	% Ole-fins	% Arom-atics	% Satu-rates	C (1)	T (2)	MTBE (%)	EtOH (%)	ETBE (%)	IPA (%)	TBA (%)	R+M/2	NB (3)	Article (4)	Pg (5)	Table (5)	Fuel	Comments
287	7.5	208	255	0.0	7.0	76.0		83	10.4	.	.	.	.	86.7		RFG Clean Air		X	9	7/90 (8)
288	7.5	204	335	.	.	.		.	.	.	12.7	.	.	90.7		SAE 902132	2	2	D	
289	7.5	200	327	8.6	22.7	68.7	*	100	.	.	.	.	.	86.3		CM-79-71	16	II,I	19	
290	7.5	197	317	5.4	19.0	75.6		100	.	.	.	.	.	75.8		CRC 515	D-5	D-V	320	
291	7.5	196	304	0.0	19.0	60.0		79	11.3	.	.	.	.	86.8		RFG Clean Air		X	8	7/90 (8)
292	7.5	185	331	0.4	30.6	69.0	*	100	.	.	.	.	.	87.3		SAE 750451	8	I	2	
293	7.5	.	.	.	.	.		.	.	.	.	.	.	.		GMR-6589	23	4	Minimum	

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7. MTBE added to the reported saturate value. 3% unknowns reported.
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